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92.202E & 94.060E

DRAFT ENVIRONMENTAL IMPACT STATEMENT/ DRAFT ENVIRONMENTAL IMPACT REPORT

ALTERNATIVES TO REPLACEMENT OF THE EMBARCADERO FREEWAY AND THE TERMINAL SEPARATOR STRUCTURE

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This is the Draft of the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure. A public hearing will be held on the adequacy and accuracy of this document. After the public hearing, the Planning Department of the City and County of San Francisco, the California Department of Transportation (Caltrans), and the Federal Highway Administration will prepare and publish a proposed Final EIS/EIR which will contain a summary of all relevant comments on this Draft EIS/EIR and the agencies' responses to those comments. The proposed Final EIS/EIR will describe the "preferred alternative" and may also make changes to the text of this Draft EIS/EIR.

Public agencies and those members of the public who testify at the hearing on the Draft EIS/EIR will automatically receive a copy of the proposed Final EIS/EIR, along with a notice of the date reserved for certification of the EIR; others may received such copies and notice on request or by visiting offices of the Planning Department. (Approximately 400 copies will be printed; those not distributed to public agencies and commenters will be available on a first come first served basis.) The proposed Final EIS/EIR will be considered by the San Francisco City Planning Commission in an advertised public meeting and certified if deemed adequate. Following certification by the City Planning Commission, or the Board of Supervisors on appeal, any changes to the proposed Final EIS/EIR and copies of the certification motion will be available for incorporation into the document. The certified Final EIR will be used by project decision makers at the local, regional, and state level. The Final EIS will be circulated for public review and will be referenced in the Federal Highway Administration's Record of Decision on the project.

If you do not plan to comment on the Draft EIS/EIR, but you would like to receive a copy of the Final EIS/EIR, please fill out and mail the post card provided on the back cover of this document.

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92.202E & 94.060: ALTERNATIVES TO REPLACEMENT OF THE EMBARCADERO FREEWAY AND TERMINAL SEPARATOR STRUCTURE IN THE CITY AND COUNTY OF SAN FRANCISCO (FORMERLY STATE ROUTE 480)

DRAFT
ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT

Submitted Pursuant to
(State) Division 13, Public Resources Code
(Federal) 42 U.S.C. 4332(2)(c), and 49 U.S.C. 303 by the

U.S. DEPARTMENT OF TRANSPORTATION
Federal Highway Administration
and
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AND COUNTY OF SAN FRANCISCO
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The following persons may be contacted for additional information concerning this document.

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U.S. DEPARTMENT OF TRANSPORTATION
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and
THE STATE OF CALIFORNIA
Department of Transportation
and
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Date

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Fred J. Hempel, Division Administrator
Region IX, Federal Highway Administration

The City and County of San Francisco and the California Department of Transportation (Caltrans) propose to realign the middle segment of The Embarcadero surface roadway on San Francisco's downtown waterfront, add new ramps and/or modify existing ramps to the I-80/U.S. 101 freeway, and implement related traffic and transit improvements on local streets in the northeastern sector of San Francisco. The proposed improvements are intended as alternatives to full, in-kind replacement of the former Embarcadero Freeway and ramp connector known as the Terminal Separator Structure (TSS), both of which were demolished as a result of damage sustained in the October 1989 earthquake. Alternatives being considered include the No-Build and four build alternatives. Each alternative would make land available for uses other than transportation facilities and would accommodate travel demands projected for the year 2015. Potential adverse impacts and mitigation measures have been identified in the following areas: transportation, air quality, hazardous materials, and cultural resources.

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SUMMARY

This document is a Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) prepared jointly by the Planning Department of the City and County of San Francisco, the California Department of Transportation (Caltrans), and the Federal Highway Administration (FHWA) to analyze potential impacts of a proposed transportation project in downtown San Francisco. This EIS/EIR is intended to satisfy requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Pursuant to CEQA Guidelines Section 15123 and 40 CFR Part 1502.12, the following summary section briefly describes the proposed project alternatives, the main impacts that would result from one or more of the alternatives, proposed mitigation measures that would reduce or avoid those impacts, unresolved issues and areas of controversy. For a more in-depth description of the project, and a description of all its potential impacts and mitigations, please refer to later sections of this document (Section 2: Alternatives, and Section 4: Environmental Consequences and Mitigation Measures).

S.1 PROJECT DESCRIPTION

The City and County of San Francisco proposes to construct a new roadway, freeway ramps, and associated street improvements in place of the elevated Embarcadero Freeway and ramp connection known as the Terminal Separator Structure (TSS), both of which were demolished as a result of damage sustained during the Loma Prieta Earthquake of October 1989. The transportation improvements are proposed as alternatives to an in-kind replacement of the former facilities which constituted State Route 480, and provided access to and from the regional freeway system and downtown San Francisco. The City has defined the proposed project as Alternatives to Replacement of the Embarcadero Freeway and the TSS.

The purpose of the proposed project is fourfold:

1. Restore local and regional transportation connectivity affected by the 1989 Loma Prieta Earthquake and the loss of the Embarcadero Freeway and TSS;

2. Provide ramp capacity without building the amount of elevated structures formerly occupied by the Embarcadero Freeway and TSS, taking advantage of surface streets and transit to accommodate travel demand;

3. Enhance the integration of different modes of transportation in the project area including automobiles, ferries, buses, light rail, trucks, and pedestrians and bicycles; and

4. Improve the appearance of the project area; maximize physical and visual access to the waterfront and minimize physical intrusions into commercial and residential areas of San Francisco, pursuant to long-standing goals and urban design concepts of the Northeastern Waterfront Area Plan, an element of the San Francisco Master Plan.

Five project alternatives are under consideration and are analyzed in this EIS/EIR at an equal level of detail; they include a "No Build" alternative and four "Build" alternatives. Two of the "Build" alternatives include variations in the proposed treatment for the I-80 eastbound off-ramp from the Peninsula. All of these alternatives and variants or options are described briefly below:

ALTERNATIVE ONE: NO BUILD (FIGURE 2.1, P. 54)

The No Build Alternative does not propose any project-related construction for the project area. No on- or off-ramps to the freeway would be constructed, and no operational or surface street improvements would be implemented. Freeway connections, local streets in downtown, and the six-lane roadway along The Embarcadero between Folsom Street and Broadway would remain in their current configuration, except as modified under separate planned projects such as the MUNI F-Line (light rail) planned for the Embarcadero surface roadway median.

ALTERNATIVE TWO: MID-EMBARCADERO ROADWAY (FIGURE 2.2, P. 57)

Alternative Two would realign and upgrade the existing surface roadway along The Embarcadero between Folsom Street and Broadway as a four-lane roadway with curb-side parking lanes that would convert to traffic lanes in peak periods (for a total of six lanes). The planned MUNI F-Line (light rail) would be accommodated in the roadway median, and the roadway would curve gently to the west in front of the Ferry Building. No new freeway on- or off-ramps would be constructed under this alternative, although some operational and surface street improvements would be implemented in the downtown area. The estimated cost of Alternative Two is $62 Million, and construction would take about 20 months.

ALTERNATIVE THREE: MID-EMBARCADERO ROADWAY AND NEW PENINSULA ACCESS RAMPS (FIGURE 2.3, P. 67 AND FIGURE 2.4, P. 68)

Alternative Three would realign and upgrade the existing surface roadway along The Embarcadero similar to Alternative Two and would provide three continuous traffic lanes in each direction during peak periods, with the curb lanes providing parking in off-peak periods. Alternative Three would also modify the existing Fremont Street off-ramp from I-80 westbound to allow traffic direct access to Folsom Street, and would construct a new on-ramp to I-80 westbound and U.S. 101 southbound at Harrison Street, near Essex Street. This alternative would also provide additional off-ramp capacity from I-80 eastbound, and would either construct a new off-ramp to Second Street (the Second Street Option), or would widen the freeway's approach to the existing Fourth Street off-ramp (the Fourth Street Option). Under both options, Alternative Three would also convert the current PM peak-period carpool lanes on the Bryant Street approaches to the Sterling Street on-ramp to mixed-flow operation, and would shift the PM peak-period carpool restriction to the Essex Street approach to the Bay Bridge (I-80 eastbound). Alternative Three would also implement a package of operational and surface street traffic improvements to facilitate traffic flow in downtown and access to and from the freeway. The estimated cost of Alternative Three is $102 Million with the Second Street Option and $101 Million with the Fourth Street Option, and construction would take about 21 months.

ALTERNATIVE FOUR: MID-EMBARCADERO ROADWAY WITH TRAFFIC MODIFICATIONS (FIGURE 2.5, P. 75)

The configuration of the Embarcadero roadway under this alternative would be the same as with Alternative Two and would provide three continuous traffic lanes in each direction during peak periods, with the curb lanes providing parking in off-peak periods. Alternative Four would also modify the existing Fremont Street off-ramp from I-80 westbound to allow traffic direct access to Folsom Street, and would implement surface and operational traffic improvements similar to Alternative Three. No new on- or off-ramps to I-80/U.S. 101 would be provided. The estimated cost of Alternative Four is $68, and construction would take about 20 months.

ALTERNATIVE FIVE: CURVED MID-EMBARCADERO ROADWAY AND NEW PENINSULA ACCESS RAMPS (FIGURE 2.6, P. 81 AND FIGURE 2.7, P. 82)

Alternative Five would be identical to Alternative Three, except for modifications in the alignment of the Embarcadero roadway across from the Ferry Building. In this alternative, the northbound lanes would follow the existing straight alignment through the Ferry Building area, and the southbound roadway alignment would diverge from the northbound lanes to curve westward directly in front of the Ferry Building, creating a plaza area between the northbound and southbound lanes. The Embarcadero roadway would provide three continuous traffic lanes in each direction during peak periods, with the curb lanes providing parking in off-peak periods. Alternative Five would also modify the existing Fremont Street off-ramp from I-80 westbound to allow traffic direct access to Folsom Street, and would construct a new on-ramp to I-80 westbound and U.S. 101 southbound at Harrison Street, near Essex Street. This alternative would also provide additional off-ramp capacity from I-80 eastbound, and would either construct a new off-ramp to Second Street (Second Street Option), or would widen the freeway's approach to the existing Fourth Street off-ramp (Fourth Street Option). Under both options, Alternative Five would also convert the current PM peak-period carpool lanes on Bryant Street to mixed-flow operation, and would shift the PM peak-period carpool-only restriction to Essex Street. Alternative Five would also implement a package of operational and surface street traffic improvements to facilitate traffic flow in downtown and freeway access. The estimated cost of Alternative Five is $103 Million with the Second Street Option and $102 Million with the Fourth Street Option, and construction would take about 21 months.

S.2 SUMMARY OF MAJOR ENVIRONMENTAL IMPACTS AND MITIGATIONS

Potential impacts of the project alternatives described above have been analyzed by comparing conditions that would result from the build alternatives in future year 2015 to pre-earthquake (1989) and existing (1993-95) conditions. Comparisons are also made between each build alternative, and between the build alternatives and the No Build Alternative in the future analysis year of 2015. The main impacts of the proposed alternatives are described below, along with proposed mitigation measures; baseline comparisons (to 1989, 1993-95, and no-build 2015) are presented where relevant to an understanding of the impact. For a more in-depth discussion of all potential impacts and mitigation measures, please refer to Section 4: Environmental Consequences and Mitigation Measures.

In general, all build alternatives would improve access along The Embarcadero and within the downtown area in order to meet projected travel volumes. Alternatives Three and Five would also improve access to/from the regional freeway system, as would Alternative Four, but to a slightly lesser degree. Potential environmental impacts and mitigation measures associated with operation and/or construction of the proposed alternatives relate to traffic, transit, air quality, hazardous materials, and archaeological resources. Potential economic effects would result from displacement of Port of San Francisco parking facilities.

LAND USE (PP. 211 TO 228)

The removal of the elevated Embarcadero Freeway, the Terminal Separator Structure (TSS), and associated ramps freed up approximately 8.5 hectares (21 acres) of land formerly occupied by these transportation facilities. Realignment of the existing Fremont Street off-ramp under Alternatives Three, Four, and Five would reuse approximately 0.3 hectares (0.7 acres) on Assessor's Block 3737. Provision of a new on-ramp to I-80 west/U.S. 101 south under Alternatives Three and Five would reuse approximately 0.5 hectares (1.3 acres) on Assessor's Blocks 3763 and 3764. Some or all parcels not reused for transportation facilities could be reused for other uses.

With one exception, all roadway and ramp features of the build alternatives would be located within existing transportation facility right-of-way. The one exception would occur under Alternative Five, which would use approximately 0.15 hectares (0.37 acres) of the eastern edge of Justin Herman Plaza, a Section 4(f) (i.e. park/open space) resource located opposite the Ferry Building. Mitigation of this impact would require compressing the roadway median proposed in Alternative Five. (See p. 228 for an explanation and illustration of "Mitigated Alternative Five.") This potential impact and mitigation are discussed further in the attached Draft Section 4(f) Evaluation.

Within existing right-of-way, all build alternatives would realign the roadway, expand pedestrian facilities, and accommodate the planned MUNI F-Line (light rail). These actions would require use of portions of the existing Embarcadero roadway median currently used for off-street parking. All build alternatives would also use approximately 34 square meters (375 square feet) of land from the 557 square meter (6,000 square foot) office plaza in front of the Bayside Plaza office building on The Embarcadero at Howard Street. This office plaza is within the right-of-way of the former Embarcadero Freeway and currently includes a circular bench and fountain sculpture designed by Ruth Asawa. The proposed encroachment into this plaza, which would accommodate a 4.5 meter (15 foot) -wide sidewalk and a .6 meter (two foot) -wide section of roadway, would not necessitate repositioning of the bench and fountain sculpture.

The I-80 eastbound off-ramp at Second Street, proposed under the Second Street Option of Alternatives Three and Five, would require elimination of the existing sidewalk and curb parking on the north side of Stillman Street between Second and Third Streets. Alternatives Three and Five would include the reopening of Davis Street between Clay and Washington Streets to vehicular traffic. This section of Davis Street was closed for the construction of the Clay and Washington ramps of the Embarcadero Freeway and is currently used as a landscaped pedestrian walkway.

The following land use mitigation measures are proposed as part of the project:

> To avoid the intrusion into Justin Herman Plaza that would occur under Alternative Five, the City would realign the roadway under this alternative so that the western curb of The Embarcadero would abut but not encroach on the plaza. (See Figure 4.1-5.) This realignment would eliminate the potential land use impact and would reduce the potential size of the plaza area proposed between the northbound and southbound lanes, effectively eliminating the possibility of an F-Line turn-around loop within the plaza. Other characteristics and potential impacts of the resulting roadway would be similar to Alternative Five as originally proposed.
>
> To assure a finished edge where the Embarcadero roadway would adjoin Justin Herman Plaza and park land on Assessor's Block 202, the Department of Public Works and the office of the Chief Administrative Officer (CAO) would coordinate design and construction of the roadway and sidewalk with staff of the City's Recreation and Park Department.

VISUAL QUALITY AND URBAN DESIGN (PP. 228 TO 240)

All five project alternatives would have a beneficial impact on the visual quality of the project area, as compared to the pre-earthquake condition when elevated ramp and freeway structures crossed the area, blocking views of the San Francisco Bay. All build alternatives would also include widened pedestrian facilities along The Embarcadero between Folsom Street and Broadway, and would accommodate the planned Rincon Point Park at The Embarcadero and Folsom Street. Specific designs for pedestrian facilities will be developed as part of the ongoing Mid-Embarcadero Open Space (MEOS) project.

The following urban design and light and glare mitigation measures are proposed as part of the project:

> To avoid the intrusion into Justin Herman Plaza that would occur under Alternative Five, the City would realign the roadway under this alternative so that the western curb of the Embarcadero roadway would abut but not encroach on the Plaza. (See Figure 4.1-5.) This realignment would eliminate the potential land use impact and would reduce the potential size of the plaza area proposed between the northbound and southbound lanes, effectively eliminating the possibility of an F-Line turn-around loop within the plaza. Other characteristics and potential impacts of the resulting roadway would be similar to Alternative Five as originally proposed.
>
> To enhance the appearance of the new off-ramp proposed at Second and Stillman Streets under the Second Street Option of Alternatives Three and Five, the City would plant street trees or other landscape features along the new ramp and/or incorporate public art work such as a mural or bas relief into the ramp design.
>
> To enhance the appearance of the modified off-ramp at Fourth and Bryant Streets proposed under the Fourth Street Option of Alternatives Three and Five, the City would replace the landscaping that would be removed to achieve proposed modifications, and/or plant street trees in the vicinity.
>
> To prevent or reduce glare from temporary lighting during construction periods, the City would require project contractors to divert any lighting for nighttime or early morning construction away from traffic and residential areas.

TRANSPORTATION (PP. 240 TO 359)

Travel Demand. Prior to the 1989 earthquake, the elevated Embarcadero Freeway and the TSS provided direct access between the regional freeway system and several "touch-down" points in downtown San Francisco. The pre-earthquake transportation facilities accommodated greater overall travel volumes than are produced in or attracted to the project area today. By 2015, the total number of daily person trips produced in or attracted to the project area is projected to increase above existing volumes by approximately 23%, with transit trips expected to increase at a faster rate (30%) than auto trips (15%). The total number of future trips projected is approximately the same among alternatives, with a similar transit vs. automobile mode choice (54% transit, 46% auto). Alternatives Three and Five would have two to three percent more vehicles entering or leaving the project area, during the AM and PM peak hours, because of more direct accessibility to/from the I-80 freeway.

Traffic Patterns. After the 1989 earthquake, traffic patterns adjusted to changes in the regional freeway system and its connections to the surface street system. Traffic redistributed from the elevated Embarcadero Freeway and the Terminal Separator Structure (TSS) to the surface streets and also spread itself more broadly throughout the streets west of the project area to take advantage of the additional street and freeway ramp capacity available. At the same time, traffic volumes on the streets leading to the remaining freeway ramps increased due to greater concentration of demand.

Future traffic circulation patterns would be similar to those existing today, except that the full reopening of I-280 and the completion of the I-280 ramps to King Street at Fifth Street, would provide new alternative routes to north-south traffic, with some vehicles shifting from local streets (Fremont, First, Third, or Fourth Streets) to The Embarcadero. Alternatives Three, Four, and Five would alter the routes open to some drivers by adding or altering ramps to/from the I-80/U.S. 101 freeway, and by reserving the Essex Street on-ramp to the Bay Bridge (I-80 East) for carpools in the PM peak period. During this time, single occupancy vehicles heading onto the Bridge would have to use the Sterling Street, First Street, or Fifth Street on-ramps.

Street Network. In addition to providing direct access to the regional freeway system prior to the 1989 earthquake, the Embarcadero Freeway and the TSS provided queuing capacity above the City streets for cars trying to enter or exit the freeway system during periods of high volume or restricted capacity. Congested areas within the street network were generally concentrated around ramp locations, such as the intersection of Mission and Main Streets. Under existing conditions, local streets provide queuing capacity, and can become extremely congested, particularly in the PM peak period, when commuters jam approaches to the Bay Bridge (I-80 East) and I-80 West. It is estimated that extremely congested conditions resulting from an "incident" such as an accident or stall on the Bay Bridge or unusually high traffic volumes occur in the PM peak period approximately 25 to 30% of weekday evenings in the eastbound direction. On other "normal" evenings, traffic on the Bridge and ramps operate at congested, but acceptable, levels of service.

Under "normal" conditions, the impacts of each alternative have been assessed by comparison of intersection levels of service (LOS) and other measures of effectiveness including vehicle-miles and vehicle-hours traveled, travel time, and delay. Vehicle miles of travel are greater under existing conditions than for pre-earthquake and would increase even more in the future (with no great variations among alternatives), due to the fact that automobiles that used the Embarcadero Freeway and TSS prior to the earthquake now use City streets. It is estimated that the existing average driving time between mainline freeway and the intersection of The Embarcadero at Broadway has increased three to five minutes over pre-earthquake conditions, for the same reason. Differences among the No Build and build alternatives in the number of vehicle-hours, travel time, and average speeds would be minimal.

Intersection LOS are similar for most of the locations analyzed when comparing pre-earthquake, existing and future 2015 No Build conditions, with the exception of a few critical intersections on those streets leading to/from the freeway, which presently operate at LOS D or worse. These intersections, most of which would degrade to LOS E or F in 2015 No Build conditions, are: Battery Street at Bush Street, The Embarcadero at Bryant Street, Third Street at Market Street, and Fourth Street at Harrison Street and at Folsom Street. Intersections that have substantially improved since the earthquake include Main Street at Mission Street and at Market Street, Sansome Street at Pacific Avenue, Harrison Street at First Street and at Essex Street, and Second Street at Brannan Street, at Bryant Street, and at Harrison Street.

Under the build alternatives, locations of congestion would shift depending on the number and configuration of the ramp connections to the I-80 freeway. Traffic congestion on Harrison Street between First Street and Second Street would increase with construction of the I-80/U.S. 101 Peninsula-bound ramp under Alternatives Three and Five. Congestion would also occur at Essex Street. Traffic LOS in the vicinity of the Fourth Street/Harrison Street westbound on-ramp to I-80/U.S. 101 would be slightly worse under Alternatives Three and Five, which would change the existing on-ramp configuration from a lane-add to a lane-merge (a 33% reduction in ramp capacity), because of the new westbound on-ramp at Harrison Street near Essex Street.

Under all build alternatives, First Street is projected, under normal conditions, to operate in the future at an acceptable level of service with the proposed improvements along the First Street corridor (additional lane between Market and Harrison Streets). However, if an incident occurs on the Bay Bridge or the future traffic volumes are greater than projected, the level of service could quickly deteriorate along First Street, particularly under Alternatives Three and Five, which would convert the Essex Street on-ramp to carpool-only in the PM peak period, and would add a Peninsula (south)-bound ramp in close proximity.

The following street network traffic mitigation measures are proposed as part of the project:

> In order to reduce peak period traffic congestion on Battery and First Streets, install signs on Battery and Clay Streets directing southbound drivers to use Clay, Davis, and Beale Streets as an alternate route to South of Market destinations, including ramps to the Bay Bridge. Also, eliminate the nine left-side curb loading/parking spaces on Battery Street between Pine and Bush Streets in the AM peak period. (Stopping is already prohibited in the PM peak period.)
>
> In order to reduce delays in accessing the freeway, the Harrison Street approach to the I-80 on-ramp at Fourth Street would be restriped to add another exclusive lane onto the freeway. This restriping would require either removing the existing safety cones on Fourth Street, which force southbound traffic at the west curb lane to turn right, or by adding striping through the intersection, directing westbound through traffic on Harrison Street around the cones. The restriping would require removal of up to 76 on-street parking spaces in the area, and would be accompanied by a sign program alerting South of Market drivers to other on-ramps farther west.
>
> The existing configuration of Harrison Street includes one shared left-turn and freeway access lane, one shared freeway access and through lane, and two through lanes. The final configuration of Harrison Street would include one left turn-only lane, two freeway-only lanes, and three through lanes. All changes would be implemented when the intersection's level of service degrades from its existing LOS of B, to LOS E or F in the PM peak hour, as projected to occur by 2015.
>
> In order to reduce inconveniences associated with temporarily reduced street capacity and restricted circulation during construction, the City would require construction contractors to restrict any street lane reductions to off-peak or nighttime hours and notify the City of such occurrences in advance. Alternatively, if lane closures are required in peak periods, alternate lanes would be made available by restricting curb-side parking and loading.

Freeway Ramp System. With the closure of the TSS and the Embarcadero Freeway, the capacity of the connections between the downtown surface streets and the regional freeway system was reduced by 12% for the on-ramps and by 32% for the off-ramps. None of the project alternatives would replace the Embarcadero Freeway structure or rebuild the TSS that existed under pre-earthquake conditions. In 2015, Alternatives Three and Five, however, would provide the same on-ramp capacity as in pre-earthquake conditions and about 80% of the pre-earthquake off-ramp capacity. The No Build Alternative (Alternative One), Alternative Two and Alternative Four would provide the same on- and off-ramp capacity as under existing conditions (i.e. 88% of pre-earthquake on-ramp capacity and 68% of pre-earthquake off-ramp capacity).

The relationship between total capacity provided and total vehicle demand estimated to use that capacity is expressed by the demand-to-capacity ratio (d/c ratio) which provides a measure of comparable system capacity among the alternatives. The demand-to-capacity analyses conducted for the project alternatives show that all alternatives would provide sufficient on-ramp capacity to accommodate the estimated 2015 demand during both AM and PM peak hours. Alternatives Three and Five would have a lower (better) d/c ratio (0.56) than the other alternatives during the AM peak, and a similar d/c ratio (0.90) to the other alternatives during the PM peak. Under all alternatives, the PM peak hour on-ramp system d/c ratio would be lower (better) than pre-earthquake (1.16), but slightly worse than the existing conditions (0.86).

Future AM peak hour off-ramp demand would not be accommodated (d/c ratio slightly higher than one) under the No Build Alternative, and Alternatives Two and Four, which would essentially maintain the existing ramp connections. Alternatives Three and Five would accommodate future AM peak hour off-ramp demand (i.e. d/c ratio less than one). The Second Street Option of Alternatives Three and Five would have a similar d/c value (0.92) to the existing conditions (0.90), while the Fourth Street Option would be slightly better (0.88). Future PM peak hour off-ramp demand would be accommodated under all alternatives (with a future d/c value between 0.60 and 0.68). The No Build Alternative and Alternatives Two and Four, which would maintain the current off-ramp connections, would have a d/c ratio (0.68) slightly worse than existing conditions (0.63) while the d/c ratio for Alternatives Three and Five, which provide additional off-ramp capacity at Second Street or at Fourth Street, would be slightly better (0.62 and 0.60 respectively).

Mainline Freeway Operations. The maximum volume of traffic which can enter and leave downtown San Francisco using the I-80 freeway during the peak hours is determined by the maximum capacities of the Bay Bridge to the east and the Hospital Curve or the I-80/U.S. 101 junction to the south. Freeway traffic operations between these two east and south capacity constrained points are a result of traffic demand, and the configuration/capacity of both the on- and off-ramp system and the intervening freeway segments.

Prior to the earthquake, eastbound vehicles from the Peninsula used the TSS and the Embarcadero Freeway to access the San Francisco northeast quadrant. The TSS exit was located on the left side of the I-80 freeway, immediately downstream of the Fifth Street on-ramp. This forced vehicles to weave and quickly change lanes in a very short section (about 800 feet), therefore creating substantial traffic congestion, especially during the AM peak. Since the demolition of the TSS and the Embarcadero Freeway most of the eastbound vehicles now use the Seventh Street and the Fourth Street off-ramps. The TSS ramp closure combined with changes in the lane striping has eliminated that high congestion location, which has now moved back to between the Seventh Street and the Fourth Street off-ramps.

At the lower deck of the Bay Bridge, the lane configuration that existed prior to the earthquake was also restriped by Caltrans following the closure of the Embarcadero Freeway and the TSS ramps. The TSS fly-over on-ramp entered with its own lane on the Bridge, while the First Street and Essex Street on-ramps were required to merge prior to entering the Bridge on their own lane, and the buses from the Transbay Terminal (TBT) access roadway had to merge with the freeway mainline traffic. Once the fly-over was closed after the earthquake, the lane geometry was modified so that now First Street traffic enters the Bridge as an exclusive lane-add and buses from the TBT merge with Essex Street traffic. These changes have provided additional capacity to the First Street and the Essex Street on-ramps, and also to the freeway mainline, where vehicles are now not required to merge with the eastbound TBT buses.

In the westbound direction, prior to the earthquake the TSS on-ramp merged with the freeway mainline immediately upstream of the Fourth Street on-ramp, creating a bottleneck at the merge point, and backing traffic upstream from that location. Currently, because of the demolition of the TSS, vehicles enter the I-80 freeway mainline using the Fourth Street on-ramp, where congestion now occurs.

Due to higher vehicle demand, future freeway travel times in the westbound direction (from the Bay Bridge to U.S. 101) would increase during the AM and PM peak periods from existing average values of four minutes, to six or seven minutes under the No Build Alternative and Alternatives Two and Four. Alternatives Three and Five would cause a greater increase (to about seven or eight minutes for the same distance) due to the construction of the new on-ramp near Second Street which would create some additional friction between the mainline traffic and vehicles entering the freeway. The average travel distance and travel speeds would experience the opposite effect of travel time, decreasing in the future with the greatest decrease under Alternatives Three and Five.

In the eastbound direction, similar conditions would occur with a general increase in future travel time from an existing average value of four minutes, to about six or seven minutes under the No Build Alternative and Alternatives Two and Four, and to about eight minutes under Alternatives Three and Five. Ramp delay and total travel time would also increase, with a decrease in future average travel distance and travel speeds. Considering all these factors, freeway operations under Alternatives Three and Five, which have a higher number of vehicles entering the freeway system, would be slightly worse than under the No Build Alternative and Alternatives Two and Four, especially during the AM peak period.

Because the freeway system is projected to operate at capacity in the future under peak conditions regardless of the alternative selected, the 2% higher system-wide volumes projected due to the on-ramp proposed in Alternatives Three and Five would result in an extension of the peak period. In other words, peak traffic conditions in the primary commute direction (westbound in the AM/eastbound in the PM) when the mainline freeway operates at capacity, would be experienced for a slightly longer period of time each day.

Transit. All build alternatives would accommodate future planned transit improvements in downtown San Francisco, including extension of the MUNI F-Line (light rail) along The Embarcadero and expansion of the bus layover lot at Mission and Steuart Streets. In addition, all build alternatives propose an additional transit-only lane on First Street between Howard and Harrison Streets.

While some individual bus routes to or through the downtown area would experience increased delay along certain streets under all future alternatives (when compared to existing conditions) most delays would occur on short segments of streets in the downtown area, and overall average bus travel time would improve.

The following transit mitigation measures are proposed as part of the project:

> To eliminate the potential deficiency of transit bus loading space in front of the Ferry Building, which could substantially affect traffic circulation along the northbound lanes of The Embarcadero if busses were to stop along the curb during peak periods, the City would implement one of the following mitigation options:
>
> a) Modify the lengths of the two 200-foot loading bays proposed in all alternatives, such that one bay would be long enough (about 300 feet) for four busses to stop simultaneously. Implementation of this mitigation measure would limit the size of the pedestrian area proposed for immediately in front of the Ferry Building in all alternatives and would have urban design implications for that area.
>
> b) Widen one or both of the two 200-foot loading bays proposed (to about 45 feet), such that either the northern bay could accommodate bus loading inside and outside, or both bays could accommodate bus loading outside with automobile loading inside. ("Inside" means within the bay; "outside" means against the curb or island that separates the bay from the roadway.) Implementation of this mitigation measure would limit the size of the pedestrian area proposed for immediately in front of the Ferry Building in all alternatives and would have urban design implications for that area.
>
> c) Provide a supplemental loading area somewhere else in the vicinity of the Ferry Building. Implementation of this measure would have different effects, depending on the location selected for the supplemental loading area. If the supplemental area was in front of Pier One or the Agriculture Building, the width of pedestrian facilities in those areas would be reduced. If the supplemental area was along the southbound lanes of the roadway, the width of pedestrian facilities in that area and in front of the Ferry Building would be reduced. If the supplemental area was between the Agriculture Building and the Ferry Building, decking-over or " filling" a piece of the Bay would be required. If the supplemental area was on the Ferry Plaza, pedestrian access areas could be reduced. In general, policies of the Bay

Conservation and Development Commission (BCDC) would discourage filling the Bay or restricting pedestrian access on the Ferry Plaza. Filling a piece of the Bay would require authorization from BCDC, as well as a Section 404 permit from the US Army Corps of Engineers, and would have undetermined impacts requiring additional analysis prior to selection of this location.

To minimize or eliminate inconveniences associated with relocation of bus stops during construction, the City would contact each transit operator (primarily MUNI and GGBHTD) whose bus stops would be moved during construction and determine the best temporary location for these stops during each phase of the construction period. The ability of buses to stop along The Embarcadero would be considered in developing the final construction staging plans, and bus stops would be relocated no more than one block from their existing locations.

In Alternatives Three and Five, the electric trolley wires on Third Street at the I-80 overpass used by MUNI Routes 30 and 45 would be affected during certain construction phases. Analysis of construction phasing indicates the trolley wires can be kept available except for short periods of time at night when Routes 30 and 45 do not operate on Third Street.

To ensure maintenance of overhead trolley wires during the operating hours of MUNI Routes 30 and 45, the final construction staging plan would require early notification of MUNI when work is scheduled in the vicinity, and coordination regarding availability of the wires.

Pedestrian and Bicycle Facilities. All build alternatives would widen the bay-side promenade and the land-side sidewalk along The Embarcadero, and would improve existing pedestrian crossings. All build alternatives would also include a Class Three bicycle lane along The Embarcadero. A Class Three bicycle lane is a continuous pavement width designated for bicycle use by special signs, rather than by pavement striping and markings. In off-peak periods, the bicycle lane would be separated from the curb by parked cars; in peak periods, the bicycle lane would be against the curb. Under both circumstances, the width of the bicycle lane would meet or exceed Caltrans minimum standards for marked (Class Two) lanes which require five feet in width if adjacent to parked cars, and four feet if not. The total curb lane would be 15 feet wide, leaving eight or nine feet for parked cars and six feet for bikes in off-peak periods, and four feet for bikes and eleven feet for traffic in peak periods.

Existing sidewalks would be narrowed at six locations under all build alternatives: on the west side of The Embarcadero, immediately south of Broadway; on the west side of The Embarcadero, between Pier 3 and Pier 5; on the west side of The Embarcadero, through the MUNI bus layover area; on the east side of Third Street at Market Street; at the pedestrian island at Market and Kearny Streets; and on the north or south side of Bryant Street between Main Street and The Embarcadero. Pedestrian level of service for the build alternatives would remain acceptable at these locations: 11 pedestrians per foot per minute (p/f/m) at Embarcadero south of Broadway; 1.4 p/f/m at Embarcadero between Piers 3 and 5; 0.7 p/f/m at the Embarcadero/MUNI layover yard; 3.7 p/f/m at Third and Market Street; 1.5 square meters (16 square feet) per person waiting area at the pedestrian island at Market and Kearney/Geary Streets; and 1.0 p/f/m at Bryant between Main Street and The Embarcadero.

The existing sidewalk on the north side of Stillman Street, between Second and Third Streets, would be eliminated under the Second Street Option of Alternatives Three and Five, because of the proposed I-80 eastbound off-ramp. The existing sidewalk on the south side of the street would remain. Pedestrian access and level of service along this segment of Stillman Street would remain acceptable.

Under all build alternatives, pedestrians crossing The Embarcadero in front of the Ferry Building would require two signal cycles, one to cross the northbound, and one to cross the southbound lanes. In one direction, the cycles would be staggered, so that pedestrians could walk across both sides of the roadway without stopping; in the other direction, pedestrians would have to wait in the roadway median, just as they do under existing conditions. All alternatives would provide sufficient queuing area in the roadway median to minimize the potential for conflicts between pedestrians and automobiles and light rail vehicles.

Alternatives Three and Five would convert Harrison Street to one-way westbound operation starting at First Street instead of the present Third Street, and would therefore increase northbound to eastbound right-turn traffic at the intersections of Third and Folsom Streets and at Second and Folsom Streets. Both of these intersections would have moderate to heavy pedestrian flows on the conflicting crosswalk.

The following pedestrian and bicycle mitigation measures are proposed as part of the project:

> In order to improve pedestrian level of service on the narrowed sidewalk along the west side of The Embarcadero just south of Broadway, the City would remove existing obstructions (newspaper racks, mail boxes, etc.) and/or would not plant trees in this area of narrowed sidewalk.
>
> To reduce the potential for automobile and pedestrian conflicts at the unsignalized intersection of Folsom and Essex Streets under Alternatives Three, Four and Five, the City would install pedestrian signs and barriers to direct pedestrians away from the crossing of Essex Street, and install a crosswalk on the east side of Essex Street to complement the one on the west side, so that pedestrians on the south sidewalk of Folsom Street can detour around the triple right-turn.
>
> To reduce the potential for automobile and pedestrian conflicts, the City would prohibit right turns on red for northbound to eastbound movements at Third Street and Folsom Street and at Second Street and Folsom Street under the Second Street Option of Alternatives Three and Five. As an alternative to prohibiting right turns on red, the City would consider implementation of a pedestrian "scramble phase" at these intersections, so that pedestrians would be able to cross the intersection without any conflict with vehicle traffic.
>
> To reduce inconvenience to pedestrians during construction, the City would require the construction contractor to devise and implement a construction plan that would maintain maximum pedestrian flow capacity around the Ferry Building by avoiding closure of any pedestrian facilities wherever possible and by providing temporary alternative facilities as appropriate. Access would be maintained to nearby businesses, and signs would be used to indicate paths of travel to ferries and businesses.

SOCIAL AND ECONOMIC ENVIRONMENT (PP. 359 TO 379)

All project alternatives would shift traffic on local streets throughout the system when compared with pre-earthquake and existing conditions, resulting in degraded intersection levels of service and increased vehicle queuing in some locations, but not substantially changing access to community facilities or businesses in or around the downtown area. None of the proposed alternatives would result in displacement of residential dwelling units, and none would rebuild elevated structures which divided the downtown area prior to the earthquake.

Three types of business displacement would occur under the build alternatives: (1) displacement of the Saturday Farmer's Market, located in the Embarcadero roadway median on Saturdays; (2) displacement of on-street and off-street parking spaces under the jurisdiction of the Port of San Francisco; and (3) displacement of off-street parking in lots owned by Caltrans and leased to private operators. The displacement of parking spaces under the jurisdiction of the Port of San Francisco would result in some loss of revenue to the Port, and this loss of revenue would in and of itself constitute a business displacement. There is no evidence that the loss of parking would necessarily cause business displacements other than this direct loss of revenue. (See expanded discussion, pp. 368-376.)

The Saturday Farmer's Market has operated under 90-day temporary use permits issued by the Port and 60-day temporary use authorizations issued by the City Planning Department since September 1992. Under all build alternatives, the area occupied by the market would be modified to accommodate the realigned Embarcadero roadway and the MUNI F-Line, and the market would be displaced. Based on the operating characteristics of the Saturday Farmer's Market, it appears that suitable relocation sites may be available in the area. These include the Ferry Plaza (alone or in combination with a portion of the ground level of the Ferry Building), Pier 30-32, Pier 3, and a portion of Assessor's Block 202.

The build alternatives would displace about 560 Port managed on- and off-street parking spaces in the Mid-Embarcadero area. Only about 200 on-street spaces would be replaced. While loss of parking, in and of itself, would not be considered a significant environmental effect given San Francisco's " Transit First" policy and the level of transit service in the area, the loss of parking spaces would have economic impacts on the Port. There is no evidence that indirect environmental impacts (i.e. measurable increases in noise or air pollutants) are associated with parking displacements that occur from time to time in downtown San Francisco. In fact, over the last 20-25 years, employment has increased faster than the parking supply, shifts to transit have occurred, and regional air quality has improved.

As required by Federal right-of-way rules, the project would compensate the Port for revenue loss due to parking displacement either through construction of an underground parking structure of up to 340 parking spaces beneath Block 202 and adjacent portions of Washington Street, or by direct monetary compensation.

Alternatives Three, Four and Five would displace about 300 parking places on Assessor's Block 3737. Alternatives Three and Five would also displace about 55 spaces on Assessor's Block 3763. The loss of parking could be compensated for by use of unused off-street parking capacity in the area.

The expenditure of construction funds on the build alternatives would generate economic benefits for the San Francisco Bay Area by providing construction jobs and by requiring purchases of construction materials.

NOISE (PP. 379 TO 391)

Existing ambient noise levels in the project area are less than levels experienced prior to the earthquake when traffic volumes were higher and elevated transportation facilities crossed the area. In the future, ambient noise levels are projected to be from one dBA to three dBA higher than existing levels at sensitive receptor locations, including areas where new ramps are proposed. There would be minor differences among the build alternatives. In general, increases or decreases of less than three dBA are not perceptible to humans.

Construction noise would occur during construction of any of the build alternatives. Use of heavy equipment would be required for construction of all build alternatives. Pile driving would be required for new and modified ramp structures proposed in Alternatives Three, Four, and Five.

The following construction noise mitigation measures are proposed as part of the project:

> To reduce potential disturbances due to construction-related noise levels, the City would require that project contractors strictly adhere to the San Francisco Noise Ordinance and would require the following additional steps to be taken:
>
> - Implementation of a careful maintenance and lubrication program for heavy equipment;

- Installation of temporary noise barriers, mats, or blankets where San Francisco Noise Ordinance limits cannot be met with available equipment;
- Pre-drilling piles where soil conditions permit;
- Use of construction equipment modified to lessen noise such as welding instead of riveting, using electric-powered equipment instead of pneumatic tools, using electric instead of air or gasoline driven saws, and use of effective intake and exhaust mufflers on internal combustion engines and compressors;
- Maximizing physical separation, as far as practical, between noise generators and noise sensitive receptors, such as providing enclosures for stationary equipment and barriers around particularly noisy areas on the site, using shields, impervious fences or other physical sound barriers to inhibit transmission of noise into the surrounding community, and locating stationary equipment so as to minimize impact on the community; and
- Scheduling of noise-generating activities outside early morning and nighttime hours.

AIR QUALITY (PP. 391 TO 414)

Under Alternatives Three and Five, 2015 emissions of carbon monoxide, hydrocarbons, sulfur oxides, nitrogen oxides, and particulate matter would be less than under the No Build Alternative. Emissions under Alternatives Two and Four would be greater than the No Build Alternative, but would be far less than one percent of the total San Francisco County vehicle emissions.

Carbon monoxide concentrations were predicted for baseline conditions (pre-earthquake -- 1989, and existing --1993) and for the year 2015 at several locations throughout the project study area. These locations included potential receptor locations along The Embarcadero and numerous intersections and freeway ramps that, based on traffic data, have the potential for higher carbon monoxide concentrations than at other locations. A conservative computer analysis of carbon monoxide concentrations predicted that numerous exceedances of the Federal and State Ambient Air Quality Standards had occurred in 1989 and 1993. For the year 2015, no violations of Federal or State Ambient Air Quality Standards were predicted. Also, the build alternatives would tend to have smaller carbon monoxide concentrations than the No Build Alternative.

Dust would be generated during construction of the build alternatives. Nitrogen oxide emissions from construction equipment for all build alternatives, although temporary, could exceed standards of the Bay Area Air Quality Management District (BAAQMD). Other equipment emissions, including hydrocarbons, sulfur oxides, carbon monoxide, and particulate matter, would be below applicable standards.

The following air quality mitigation measures are proposed as part of the project:

> To reduce construction period PM_{10} emission levels by 75 percent (BAAQMD 1985, updated 1991), the City would require project contractors to implement dust control measures. Measures to reduce dust include watering construction areas, covering haul trucks and storage piles containing dirt and debris, imposing a speed limit in the construction area, paving the area as quickly as possible, and planting the non-paved areas as soon as possible.
>
> Ordinance 175-91, passed by the San Francisco Board of Supervisors on May 6, 1991, requires that non-potable water be used for dust control activities. Therefore, the City would require that the project contractor(s) obtain reclaimed water from the Clean Water Program for this purpose.
>
> To reduce exhaust emissions during construction, the City would require that private contractors not allow the equipment to idle unnecessarily, keep the engines well-tuned, and use newer equipment.

TOPOGRAPHY, GEOLOGY, SOILS, AND SEISMICITY (PP. 419 TO 428)

Construction of any of the build alternatives for the project would affect the geotechnical/seismic environment in the project area. Effects would be related to (1) the potential for differential settlement of relocated utilities, (2) temporary support of utilities that are not relocated, and (3) the effects of construction activities on adjacent existing structures. Alternatives Two and Four, which are limited to surface street and ramp modifications, would affect the project area to a lesser degree than Alternatives Three and Five, where new ramps would be constructed. Except for differential settlement of relocated utilities, impacts would be mostly temporary.

The following geotechnical/seismic mitigation measures are proposed as part of the project:

To reduce the possibility of differential settlement affecting utilities, the City would require the project contractors to implement the following measures during construction:

- Provide temporary support for utilities that are not relocated;
- Provide pile-supported foundations where possible for relocated utility segments that are previously pile-supported; and
- Use special connections between utility segments with different foundation types.

To reduce the potential for settlement of existing structures caused by construction activities, the City would require the project contractor to undertake necessary soil improvement (compaction and chemical grouting or underpinning) beneath affected structures, and to monitor their movements during construction.

HYDROLOGY AND WATER QUALITY (PP. 428 TO 438)

The project site and surrounding area are generally covered by pavement and buildings. Runoff from the areas on the western side of the existing Embarcadero roadway and inland portions of the study area is collected by the City's combined sewer system which conveys storm water and sewage to wastewater treatment facilities for treatment prior to discharge to the Bay. Most of the runoff from east of the roadway flows into the Bay without treatment.

Implementation of any of the build alternatives would result in minor increases in the amount of urban runoff delivered to the combined sewer system, mostly from the collection of runoff from the areas east of the roadway which currently drain into the Bay. Although the additional runoff would incrementally increase the volume of wastewater and pollutant load under each of the build alternatives, these effects would not be substantial given the function and capacity of the wastewater treatment facilities. The roadway design would prevent direct runoff discharge to the Bay, which would be a beneficial environmental effect.

Brackish groundwater occurs at shallow depths at the project site. Analytical testing indicates that, in some portions of the study area, the groundwater contains contaminants. Some excavations for roadway and underground garage construction and utility installation may require de-watering. The groundwater pumped during de-watering could be discharged to the combined sewer system if permitted under a Batch Industrial Wastewater Discharge Permit.

The following water quality mitigation measures are proposed as part of the project:

> To minimize the exposure of construction workers and the public to de-watering effluent, the City would require the project contractor to implement a wastewater management program for the project. Groundwater samples would be collected from well points installed as part of the de-watering system. The samples would be analyzed for chemical constituents as specified by the City's Department of Public Works' requirements for batch wastewater discharge. This would provide groundwater quality data specific to locations, so that disposal options could be considered and decided upon prior to generation of large volumes of water.
>
> To mitigate potential hazards associated with de-watering, the City would require the project contractor to develop and implement a written health and safety plan consistent with the existing Site Mitigation Plan (SMP) for the Waterfront Transportation Projects. The health and safety plan would require the identification of safety and health risk analyses for each site task and operation, employee training assignments, implementation of a monitoring program, and medical surveillance. In addition, all wells, piping, and discharge points would be within fenced areas to reduce the likelihood of the public coming into contact with contaminated groundwater.

HAZARDOUS MATERIALS (PP. 442 TO 455)

Previous investigations conducted within the study area indicate the presence of hazardous materials in artificial fill. All build alternatives would involve excavation and management of soils/fill, all or portions of which could contain hazardous materials. The soils to be excavated along the waterfront were evaluated for hazardous waste characteristics by the Department of Toxic Substances Control and were approved for classification and management as non-hazardous waste. Soils/fill underlying other portions of the study area were not evaluated for reclassification. Both hazardous and non-hazardous materials present the potential for workers and the general public to be exposed to levels of hazardous materials, possibly affecting human health and safety, unless mitigated.

The following hazardous materials mitigation measures are proposed as part of the project:

> To mitigate the potential effect of exposing workers to hazardous materials during construction, the City would require contractors to comply with the Site Mitigation Plan (SMP) approved for the Waterfront Transportation Projects, including preparation and implementation of a site-specific health and safety plan during construction, effectively mitigating the potential for public exposure to hazardous materials.
>
> Procedures for utilities maintenance would be developed and incorporated into the SMP required for all build alternatives as a separate, stand-alone document. These procedures would consist of information on the types of contaminants likely to be encountered during utility maintenance and specific requirements that work can only be carried out in accordance with a health and safety plan. These procedures would be filed with USA (Underground Service Alert) and agencies/departments that have utilities in the vicinity of the build alternatives.

CULTURAL RESOURCES (PP. 456 TO 462)

None of the proposed alternatives would alter, either during construction or operation of the facility, the characteristics of historic architectural resources within the project area that have qualified, or may qualify them, for inclusion in the National Register of Historic Places. Also, none of the project alternatives would affect any local San Francisco Landmark or historic district or any building listed in or officially determined eligible for listing in the California Register of Historic Resources.

Potential adverse impacts (e.g. damage, destruction, looting) to buried archaeological resources could occur under any of the build alternatives from several construction-related activities including subsurface construction, pile driving, and removal or grubbing out of existing below-grade remnants of the Embarcadero Freeway and the Terminal Separator Structure. Specific mitigation measures would protect archaeological resources and would be documented in a Memorandum of Agreement (MOA) between the City and County of San Francisco, the Federal Highway Administration (FHWA), the State Historic Preservation Office (SHPO), the California Department of Transportation (Caltrans), and the Advisory Council on Historic Preservation (ACHP). Mitigation measures would be consistent with general recommendations described on page 462.

If buried cultural materials are unearthed during construction, work must be halted in the vicinity of the find until a qualified archaeologist can assess its significance. If human remains are unearthed during construction, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition of the remains pursuant to Public Resources Code Section 5097.98.

S.3 UNRESOLVED ISSUES AND AREAS OF CONTROVERSY

The primary unresolved issue with regards to the present project is financial feasibility. Because the project would replace earthquake-damaged structures, the City expects to use Federal Earthquake Relief (ER) funds committed to the Embarcadero Freeway replacement project in February, 1991, and the TSS replacement project in March, 1991. All Federal funds are subject to a state or local match and are distributed through the California Transportation Commission and the Metropolitan Transportation Commission. These agencies, along with Caltrans, the FHWA, and the San Francisco Transportation Authority will make use of this EIS/EIR in making funding decisions that may change the proposed funding packages presented in Appendix A. Factors to be considered by these agencies include, but may not be limited to, the amount of money available and the ability of project alternatives to provide service comparable to the former Embarcadero Freeway.

The reuse of parcels of land formerly used by the Terminal Separator Structure and Embarcadero Freeway ramps is another unresolved issue. According to SB 181, signed by the Governor on October 5, 1991, parcels formerly used by the Embarcadero Freeway ramps may be transferred from State to local ownership as long as they are either used to reconstruct transportation facilities, or all proceeds from their sale are used for the current project. Some parcels have already been transferred to City ownership, and are planned for sale, with proceeds going to construction of the proposed project. (See proposed funding packages, Appendix A.) The future uses of these parcels and of other parcels formerly used by the Terminal Separator Structure are mostly unknown. Proposals include commercial development, open space, and use for relocation of the Transbay Terminal (currently providing regional and local bus service at Mission, First, and Fremont Streets). Where known to be "reasonably foreseeable," future projects for these parcels have been described and considered as part of the cumulative context of this analysis. Where speculative or unknown, future uses have been estimated in terms of likely transportation impacts by adjustments to the Metropolitan Transportation Commission's travel model and manual traffic assignments. (See the future context discussion, pp. 221-222, 240-241, 312-314.)

Final landscaping improvements and the design of pedestrian areas in the Embarcadero corridor that would be created by all build alternatives also remains unresolved. These features, and the relationship between the proposed roadway alignment and adjacent open spaces including Justin Herman Plaza and Assessor's Block 202, are considered part of the Mid-Embarcadero Open Space project, for which planning is ongoing.

Currently known areas of controversy surrounding the project relate to providing sufficient automobile access to the tourist-serving neighborhoods north of downtown, to potential impacts on residents near the new ramps proposed in Alternatives Three and Five, to the displacement of on- and off-street parking within the Embarcadero corridor under all build alternatives, and to the use of vacated parcels described above. All of these issues have been considered during development of this EIS/EIR, and differing points of view have been explained in the text where appropriate.

Potential impacts on residents near the new ramps proposed in Alternatives Three and Five are discussed in the transportation, noise, air quality, and socioeconomic impacts sections (pp. 264-270, 361-362, 382-385, and 403-408). Displacement of on- and off-street parking within the Embarcadero corridor, and replacement of parking, are described in the socioeconomic impacts section (pp. 368-376). The use of vacated parcels is discussed further in the explanation of the project's "future context," (pp. 221-224, 312-314, 463-465).

The elevated Embarcadero Freeway was a focus of controversy since its construction in mid-1950's (see also pp. 45 and 46). Originally planned to extend north along the San Francisco Bay and connect with U.S. 101 at the Golden Gate Bridge, the freeway was terminated at Broadway, and options for its removal were the subject of discussion in San Francisco for many years. Always a contentious issue, the freeway's removal after the 1989 Loma Prieta Earthquake stimulated controversy between those who felt that its removal would greatly enhance the downtown by eliminating a barrier dividing it from the waterfront, and those who felt that removal of the freeway would restrict access to tourist-serving neighborhoods north of downtown, such as Chinatown, North Beach, and Fisherman's Wharf. These same points of view were expressed during the scoping process for this EIS/EIR, and the issue of access is discussed in the transportation and socioeconomic impacts sections (pp. 264-270, and 363-365). In general, there are many complex factors involved in economic fluctuations and it is difficult to draw firm conclusions regarding the potential economic impacts of changed access independently of other factors such as an area-wide economic recession.

1. PROJECT PURPOSE AND NEED

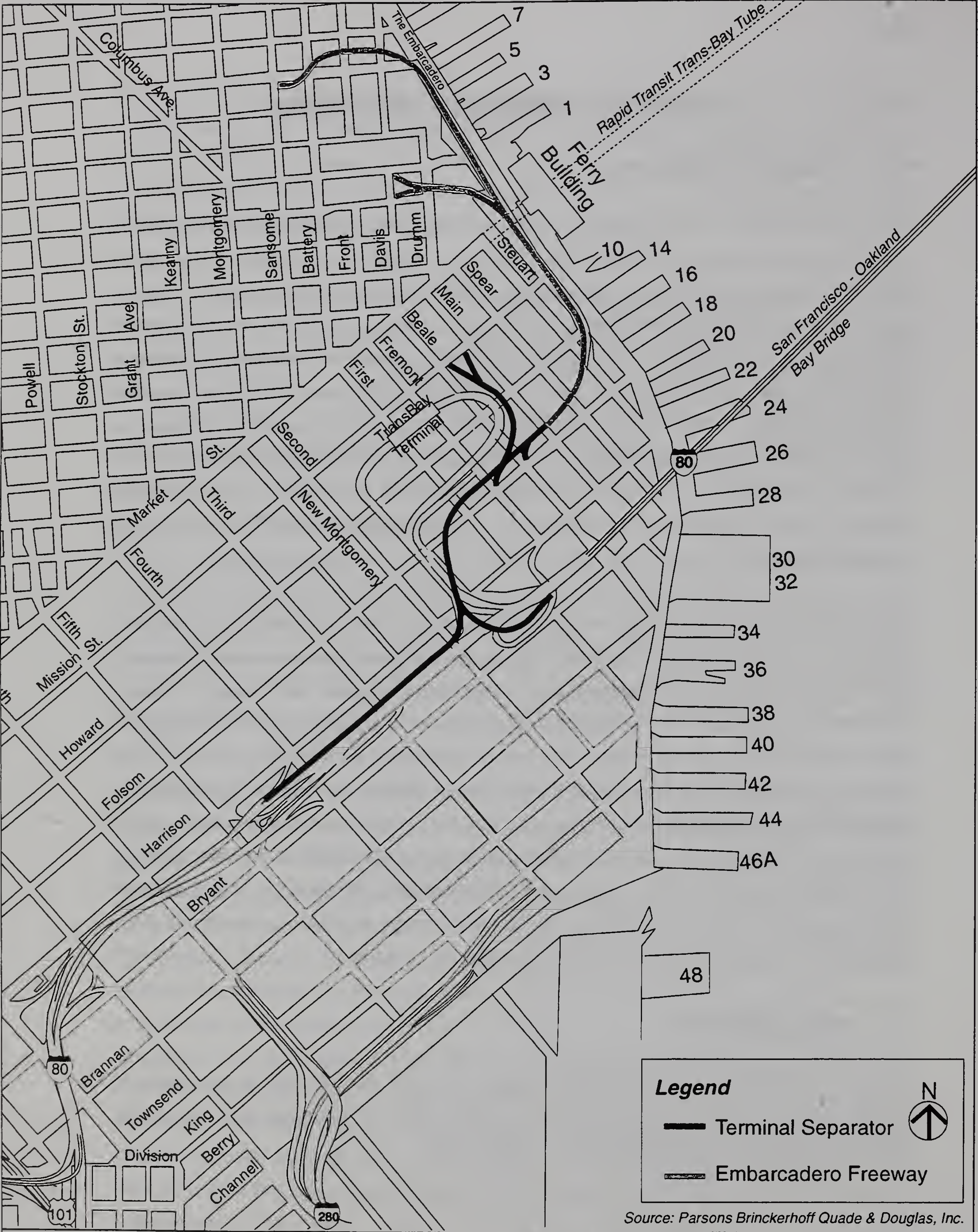
1.1 PROJECT LOCATION

The City and County of San Francisco (the City) is proposing to construct a new roadway, freeway ramps, and associated street improvements in place of the elevated Embarcadero Freeway (State Route 480) and ramp connector known as the Terminal Separator Structure (TSS), both of which were demolished as a result of damage caused by the Loma Prieta Earthquake of October 1989. Located along San Francisco's downtown waterfront, the freeway structure and associated ramps connected the Bay Bridge (I-80) and U.S. 101 with the San Francisco downtown at the following locations: Main Street (off-ramp) and Beale Street (on-ramp), Washington Street (off-ramp) and Clay Street (on-ramp), and at Broadway (on- and off-ramps). (See Figure 1-1.) (The Folsom / Beale on-ramp and the Folsom / Fremont off-ramp provided a freeway bypass for intra-San Francisco travel between the South of Market Street area and downtown.)

The northeastern sector of San Francisco, where the project is located, is a regional employment center supporting about 400,000 jobs and 8.3 million square meters (89 million square feet) of office and retail space in an approximately 590 square block area. It contains the Financial District, the Civic Center area, and primary tourist attractions, such as Fisherman's Wharf, North Beach, and Chinatown. The area is extensively served by regional and local transit, including the Bay Area Rapid Transit District (BART) rail system, San Francisco Municipal Railway (MUNI) buses, cable car, and light rail. Ferries serving Marin, Alameda and Solano County locations dock at terminals located behind and just north of the Ferry Building. The Transbay Terminal is the hub for buses from the East Bay and North Bay counties, and from communities located south on the Peninsula. Train service from the Peninsula terminates at the Caltrain Station at Fourth and Townsend Streets. (See Figure 1-2.)

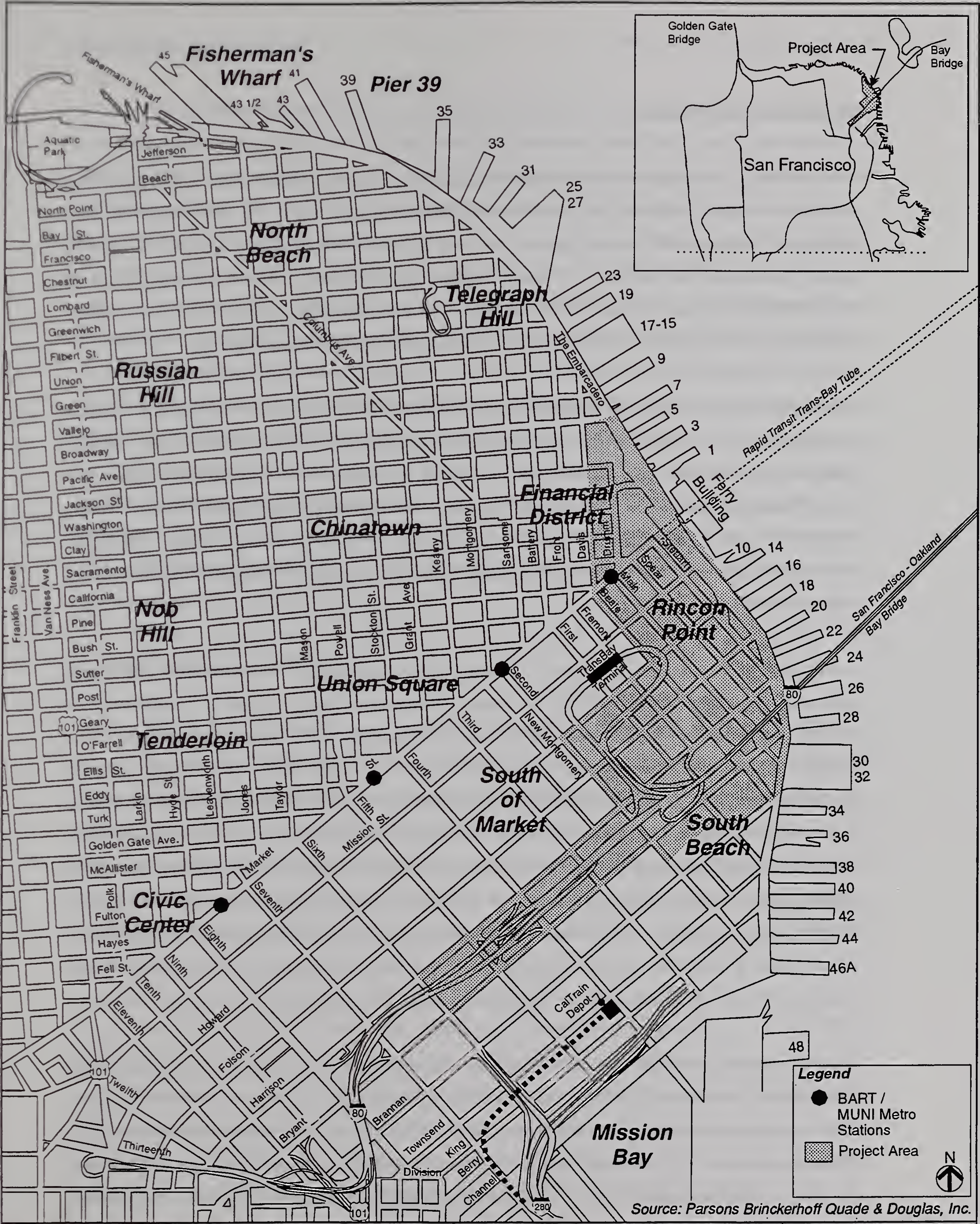
1.2 BACKGROUND

Closure of the TSS and the Embarcadero Freeway provided the City with an opportunity to evaluate both structures' role in serving traffic to and through the downtown area and vicinity and their role in the City's multimodal transportation system.



Source: Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Configuration of Embarcadero Freeway and Terminal Separator Structure (State Route 480) Prior to 1989 Earthquake	Figure 1-1



Source: Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator

Project Area and Vicinity

Figure 1-2

Embarcadero Freeway

In the months following the Loma Prieta Earthquake, the California Department of Transportation (Caltrans) initially believed that the Embarcadero Freeway could be both repaired and seismically strengthened without great cost and in a fairly short period of time. However, additional studies by Caltrans and their engineering consultants eventually led Caltrans to conclude that the cost to repair and (seismically) retrofit the structure was equal to, or greater than, the cost to demolish, remove, and replace the structure with a new facility.

The Mayor of San Francisco proposed in early 1990 that the Embarcadero Freeway be removed and replaced with a new facility that would be comprised of a short elevated ramp, surface sections, and subsurface elements. This replacement concept, which sought to provide much of the transport function provided by the Embarcadero Freeway, was endorsed by the San Francisco Board of Supervisors (Resolution No. 262-90; April 16, 1990) with certain conditions, including the receipt of assurances of adequate replacement project funding from federal and state authorities.

In February 1991, the U.S. Secretary of Transportation committed, based upon cost estimates provided by Caltrans, $58.5 million of Federal Emergency Relief funding for preparation of environmental document, preliminary engineering, design and construction of a replacement to the Embarcadero Freeway, as long as the replacement ". . . would provide comparable service and accommodate the known corridor traffic demands for the Embarcadero Freeway." (Letter from Secretary Samuel K. Skinner to Mayor Art Agnos, dated February 7, 1991.) These funds were to be made available from the $1 billion Loma Prieta Emergency Relief appropriation for transportation, passed by Congress in late 1989, and administered by the Federal Highway Administration (FHWA). Following commitments by the California State Transportation Commission to fund the cost of removing the Embarcadero Freeway, San Francisco formally requested the removal and Caltrans' contractors initiated the demolition in the summer of 1991.

The Embarcadero Freeway was part of the state highway system, carrying the designation State Route 480. On October 5, 1991, Governor Wilson signed Senate Bill No. 181, which deleted the route from the state highway system and established the intent to transfer all state-owned right-of-way associated with the freeway to San Francisco, with the provision that such right-of-way be used in a replacement facility -- either directly as part of a replacement project, or indirectly through disposition and investment of the proceeds in the replacement project.

Prior to the Loma Prieta Earthquake, San Francisco had been involved since the mid-1970s in planning new roadway and transit facilities along the downtown waterfront, both to the north and south of the Embarcadero Freeway. The Embarcadero roadway was to be modified into a landscaped boulevard with light rail transit placed in the median, and with enhanced pedestrian and bicycle facilities. The roadway was to be realigned in the vicinity of the Embarcadero Freeway and a historic trolley line (F-Line) was to be constructed immediately adjacent to the freeway on the west side. During the period of decision-making on the fate of the Embarcadero Freeway, the unaffected project elements -- which became known as North Embarcadero and South Embarcadero -- were completed in terms of planning and necessary approvals. Construction of the South Embarcadero began in October 1992 and was completed in June 1994. Construction of the North Embarcadero began in mid-1993 and is expected to be completed in late 1995. The remaining section of the waterfront, from Broadway south to the vicinity of Howard and Folsom Streets, thus became known as the Mid-Embarcadero, and subject to its own planning process. In the Fall of 1992, work was begun on an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) analyzing potential impacts of Mid-Embarcadero roadway alternatives.

Terminal Separator Structure

The Terminal Separator Structure also suffered considerable structural damage during the Loma Prieta Earthquake. After completing engineering and seismic studies similar to those conducted on the Embarcadero Freeway, Caltrans decided that the most efficient means to retrofit was to demolish and remove this facility and then build a full replacement structure similar in configuration to the one removed. Demolition and removal of the Terminal Separator Structure began in late 1992 and was completed in September 1993. During this time Caltrans completed construction drawings and was prepared to go out for bid on the full replacement in June 1993.

At the Mayor's request and with the passage of Resolution No. 229-93 by the Board of Supervisors in March 1993, Caltrans agreed to delay the contract advertisement for reconstruction of the TSS until September 1993 to allow the City to develop and evaluate alternatives to a full replacement. A study was initiated in April 1993 and by July a set of viable alternatives to the TSS was developed. These alternatives ranged from no new ramp construction at all to direct ramp connections to the Embarcadero surface roadway.

In August 1993, the Board of Supervisors adopted Resolution No. 668-93 requesting that Caltrans allow for an extension of the study deadline until February 1994, so that the most viable TSS alternatives in terms of transportation function, urban design, and economic development could be evaluated in conjunction with the already developed Mid-Embarcadero roadway alternatives (see Embarcadero Freeway section above).

The results of this transportation study demonstrated that traffic movements in the downtown area and vicinity could be served by replacement alternatives other than a full rebuild of the Terminal Separator Structure. The Board of Supervisors passed Resolution No. 99-94 in February 1994 which accepted the findings of the study and advised Caltrans that the City would not consider a full, in-kind rebuild of the TSS. The Board also directed the staff to proceed with integrating the TSS alternatives with the Mid-Embarcadero EIS/EIR study under way. Caltrans agreed with the Board's position to abandon further study of the full replacement of the TSS and discontinued the process to rebuild it (April 15 ,1994 letter from James W. Van Lobensels, Caltrans Director, to Roger Borg, FHWA Division Administrator). Both Caltrans and FHWA also concurred with combining the environmental documentation of the TSS replacement with the replacement of the Embarcadero Freeway as a time and money-saving approach.

1.3 PROJECT DESCRIPTION

The current project, which has been defined as "Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure" would be located along The Embarcadero between Broadway to the north, and Bryant Street to the south, and would extend westward between Howard and Bryant Streets to the vicinity of Sixth Street (see Figure 1-2).

There are five alternatives under consideration for the project, including a "No Build" and four "Build" configurations. Between Broadway and Folsom Street along The Embarcadero, each of the build alternatives would construct a four to six lane surface roadway with a wide (land-side) sidewalk, a bay-side promenade and on-street parking. Planned construction of the MUNI F-Line would place light rail in the roadway median. To the west of The Embarcadero, between Folsom and Bryant Streets, the build alternatives would modify existing freeway on- and off-ramps, construct new on- and off-ramps, and implement operational and surface street improvements such as new crosswalks, traffic lanes, and street directional changes. Section Two of this EIS/EIR presents a detailed description of the five alternatives analyzed in this document, as well as other alternatives which were considered but were not selected for further analysis.

The current project is included in transportation programming documents including the current approved and federally required State Transportation Improvement Program (STIP). The project is also included in the Metropolitan Transportation Commission's current Regional Transportation Program (RTP), and the Transportation Improvement Program (TIP). In some cases, the current project has been programmed as two separate efforts: replacement of the Embarcadero Freeway and replacement of the Terminal Separator Structure. The majority of project funds would be emergency relief funds, programmed independently from the STIP and distributed through the California Transportation Commission.

1.4 PURPOSE

The purpose of the current project is fourfold:

- To restore local and regional transportation connectivity affected by the 1989 Loma Prieta Earthquake and the loss of the Embarcadero Freeway and TSS;
- To provide ramp capacity without building the amount of elevated structures formerly occupied by the Embarcadero Freeway and TSS, taking advantage of surface streets and transit to accommodate travel demand;
- To enhance the integration of different modes of transportation in the project area including automobiles, ferries, buses, light rails, trucks, and pedestrians and bicycles; and
- To improve the appearance of the project area; maximize physical and visual access to the waterfront and minimize physical intrusions into commercial and residential areas of San Francisco, pursuant to long-standing goals and urban design concepts of the Northeastern Waterfront element of the San Francisco Master Plan.

Within northeastern San Francisco, the project has the objective of providing access to and from downtown and to and from the Port of San Francisco's water-side facilities. The project is intended to improve traffic flow between the North Embarcadero and South Embarcadero and facilitate regional traffic connectivity between the Bay Bridge and the northeastern section of the City and to collect and distribute traffic to and from I-80/U.S. 101.

Adopted in 1977, the Northeast Waterfront Area Plan is an element of the San Francisco Master Plan and outlines the City's transportation and development goals and urban design concepts for the Embarcadero roadway and the adjacent waterfront. The Area Plan recommends a continuous system of parks, plazas, pedestrian promenades, street greenways and bicycle paths. The Area Plan encourages enhanced pedestrian access to the shoreline and convenient and safe opportunities to cross The Embarcadero, particularly for ferry passengers transferring to other transportation modes on the west side of the roadway.

Removal of the damaged Embarcadero Freeway and TSS removed visual blight from a prominent area of San Francisco and restored scenic and historic vistas previously obstructed by the elevated structure and provided the opportunity for the City to realize long-standing goals of the Area Plan. The unimpeded view of the Ferry Building, one of San Francisco's oldest and best known structures, was restored, as were numerous vistas of the Bay from the City, and of the City from locations along the Bay's edge. The current project is intended to sustain these vistas and view corridors. In addition, the project is intended to make the existing public open spaces in the area more accessible and inviting by sustaining the elimination of any elevated structures with their concomitant noise and visual impacts, and allow for future enhancements of the open spaces.

San Francisco's Master Plan identifies The Embarcadero as a "major thoroughfare", the purpose of which is to connect districts of regional and City-wide importance. The project is intended to facilitate traffic, transit, bicycle, and pedestrian access to and from San Francisco's financial, commercial, residential, and tourist centers near the project area. Such centers include: the downtown financial district, Chinatown, the Fisherman's Wharf/Pier 39 commercial area, North Beach, Rincon Point, and South Beach/Mission Bay (see Figure 1-2).

From a regional transportation perspective, improvements to the Mid-Embarcadero roadway and to the existing I-80 ramp system are intended to provide more efficient movement of traffic between northeast San Francisco waterfront locations and East Bay and Peninsula. This would be accomplished by access improvements to the Bay Bridge (I-80) and U.S. 101, and by the continuity provided by the Mid-Embarcadero to the roadway improvements of the North Embarcadero, South Embarcadero, and the new connection of King Street to I-280.

Removal of the Terminal Separator Structure and the Embarcadero Freeway reduced the amount of land devoted to freeway structures and provided an opportunity to plan for traffic and transit investments which could better serve existing and future land use patterns. To enhance the multimodal functions of the Embarcadero roadway and to facilitate transfer between transit modes, the project intends to provide safe and convenient pedestrian crossings, including signalized mid-block pedestrian crossings. In the vicinity of the Ferry Building, the project intends to provide automobile, transit, pedestrian, and bicycle access to and from the ferries. The current project proposes to facilitate existing and future MUNI bus and light rail service on Market Street, Mission Street, and at other locations within the project area by permitting expansion of the MUNI bus layover lot at Steuart and Mission Streets and by accommodating the MUNI F-Line (light rail) in the roadway median. The MUNI Metro Turnback and MUNI Metro Extension light rail projects that are under construction in the project area are to be accommodated by the Mid-Embarcadero roadway planning and design.

The reduced amount of land devoted to freeway structures has made available land for economic growth. The project intends to minimize the amount of new facility construction required to provide adequate capacity for new uses.

1.5 NEED FOR TRANSPORTATION IMPROVEMENTS

Corridor Travel Demand And Congestion

Prior to the Loma Prieta Earthquake, the elevated Embarcadero Freeway and Terminal Separator Structure carried approximately 72,000 vehicles per weekday. In front of the Ferry Building, the Embarcadero Freeway contained two lanes plus an auxiliary lane on both the top southbound and the bottom northbound levels. During the PM peak hour, the southbound lanes of the Embarcadero Freeway between the Clay Street and Beale Street on-ramps, carried approximately 2,500 vehicles per hour (vph), with Level of Service (LOS) C; the northbound lanes also carried approximately 2,500 vph during the PM peak hour, with LOS B[1]. These northbound and southbound lanes each has single-lane connections to the Bay Bridge and U.S. 101.

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[1] For freeway operations, Level of Service B represents reasonably free flowing conditions; the ability to maneuver in the traffic stream is only slightly restricted. LOS C corresponds to stable traffic flow conditions but where small increases in flow can cause substantial deterioration in service. For a more detailed description of freeway operational characteristics for the six levels of service, see Table C-3 in Appendix C.

The two-lane Clay Street on-ramp onto the Embarcadero Freeway at Davis Street, and the three-lane Beale Street on-ramp at Mission Street were the two locations which most directly served commuter traffic leaving the downtown financial district. Back-ups at these ramps would often occur during the afternoon peak period. The two-lane Broadway on-ramp onto the Embarcadero Freeway at Sansome Street was also available to handle traffic moving from locations in the City's northeast quadrant.

The elevated freeway structure reduced traffic back-ups on City streets somewhat by functioning as a storage area for traffic waiting to enter the Bay Bridge or U.S. 101 southbound. During the weekday afternoon peak period, traffic entering the freeway often exceeded the capacity of the I-80/U.S. 101 merges. The capacity of the Bay Bridge and of southbound U.S. 101 functioned as the overriding constraint on the capacity of the on-ramps. Consequently, during the afternoon peak period, it was common for vehicles to back up on the Embarcadero Freeway, in the vicinity of Spear and Steuart Streets. On afternoons when there was an accident or a stalled vehicle on U.S. 101 or on the Bay Bridge, the back-up or queuing often overwhelmed the storage capacity of the ramps.

Vehicles coming from the East Bay exited onto the Terminal Separator Structure from the right (north) side of the Bridge using the one-and-a-half lane off-ramp, while vehicles coming from the Peninsula used the left side one-and-a-half-lane off-ramp on the west end of the Bridge. Access to the City's downtown area and nearby destinations was provided by the TSS and the Embarcadero Freeway off-ramps at Main Street, Washington Street, or Broadway/Battery Street, and the two off-ramps with direct access from the Bay Bridge to Fremont Street. The former Folsom/Beale on-ramp and Folsom/Fremont off-ramp provided a bypass via the Embarcadero Freeway for travel between downtown and the South of Market Street area.

The capacity of the northbound Embarcadero Freeway was constrained at its terminus by the traffic signal at the Broadway off-ramp. As a result, back-ups occurred at that location during the weekday morning and afternoon peak periods. On weekends, traffic would occasionally wait through three or four cycles of the signal phase at Battery Street. Traffic backed up less frequently at the Washington Street off-ramp than at Broadway because the ramp touchdown had no signal and the nearest was a block away at the Washington/Battery Street intersection. In the South of Market area, vehicle queuing usually occurred at the Main Street off-ramp due to congestion at Main and Market Streets, the nearest downstream intersection. The Main Street approach at that intersection had limited green time and did not provide enough capacity to serve the peak demand. Vehicles usually waited through two signal cycles to clear the intersection with traffic queues backing up onto the off-ramp.

Before the earthquake, the Embarcadero surface roadway provided four continuous lanes of traffic capacity along the waterfront (two northbound, two southbound), including the sections immediately adjacent to, or partially underneath, the elevated freeway. The Embarcadero surface roadway carried 26,000 to 31,000 vehicles per weekday. Traffic on the Embarcadero surface roadway was characteristically local traffic, and congestion was uncommon.

After the earthquake, the loss of the Embarcadero Freeway and Terminal Separator Structure has meant that traffic which previously used these facilities has been forced onto City streets, including especially those with direct access to and from the ramps which have remained open to U.S. 101 and the Bay Bridge. Those which remain open in the study area are the off-ramps at Fremont Street south of Howard Street, and Fremont Street at Harrison Street; and the on-ramps at First and Harrison Streets, Harrison and Essex Streets, Harrison and Fourth Streets, and at Sterling and Bryant Streets.

Following the earthquake, weekday traffic volumes on the Embarcadero surface roadway increased to between 38,000 and 42,000 vehicles per day. Congestion is common at Embarcadero intersections, such as Broadway, Washington Street, and Mission Street. More serious congestion problems occur away from the waterfront, on streets and at intersections with direct access to U.S. 101 and the Bay Bridge. For example, weekday afternoon peak period traffic volumes and resultant intersection congestion on First Street, northward from the on-ramp to the Bay Bridge, can cause traffic to back up several blocks or more. Because of a more than 50% increase (from 1,500 to 2,300) in the traffic volumes using the Fremont Street and Harrison Street off-ramps from the Bay Bridge, similar congestion can occur during the weekday morning peak hour on Fremont Street at the intersections of Howard, Mission, and Market Streets, and on Front Street at the intersections of Pine and California Streets.

The loss of transportation service following the Loma Prieta Earthquake has caused additional congestion on routes to and from the waterfront, which has, in turn, reduced the overall level of service in portions of the downtown street system. This situation is expected to become worse if improvements are not made in the Embarcadero corridor. Under future conditions, traffic volumes are anticipated to increase in downtown, particularly on The Embarcadero and the streets leading to and from the remaining ramps. Without improvements to surface streets and ramp connections, increased traffic volumes would result in additional delays throughout downtown. For example, during the AM peak hour, the intersection of The Embarcadero and Bryant Street would operate at level of service (LOS) F by the year 2015[2]. The intersections of Third and Mission Streets and Fifth and Folsom Streets would fall from LOS B today to LOS D in 2015. The intersection of Third and Market Streets would change from LOS D to LOS E. In the PM peak hour, the intersection of Second and Harrison Streets would continue to operate at LOS D today and in 2015.

Reconstruction of the Mid-Embarcadero roadway, improvements to the freeway ramp system, and associated street improvements are intended to improve the capability of the multimodal transportation system to accommodate existing and future transportation demand. The improvements are intended to serve post-earthquake traffic volumes and vehicular turning movements, enhance pedestrian and bicycle movements, decrease transit vehicle delay, and physically accommodate planned rail and bus operations essential to meeting the future needs of the corridor.

Roadway Deficiencies and Safety Issues

Within the project area, the alignment of the existing Embarcadero surface roadway was designed for local traffic only and to accommodate the support structures of the elevated freeway and at-grade railroad tracks (which served rail freight movements into the 1980s). Due to design constraints imposed by the freeway overhead, the existing alignment is meandering and operationally inefficient, creating confusion for motorists and pedestrians alike. A few key mid-block pedestrian crossings remain unsignalized, and lane markings and parking space markings are generally absent or poorly defined. Driveways into Port facilities are not clearly identifiable to motorists on The Embarcadero.

The meandering roadway and poor striping are characteristic of the Mid-Embarcadero, and generally reflect the roadway's history as a waterfront industrial highway. The project intends to

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[2] At signalized intersections, Level of Service (LOS) A describes a traffic condition where drivers experience insignificant or no delays; LOS B represents stable flow with minimum delay; LOS C represents stable flow with acceptable delays and most drivers feel somewhat restricted; LOS D represents a condition where traffic flow is becoming unstable and drivers may have to wait through more than one red signal indication; LOS E represents unstable operations with significant delays and drivers may have to wait through several signal cycles; and LOS F represents jammed conditions where the intersection operates below capacity with queues extending to upstream intersections. See Appendix C for detailed descriptions of LOS designations for signalized intersections.

rectify these deficiencies by creating a uniform alignment and by integrating the Mid-Embarcadero roadway with the North and South Embarcadero projects, which have and will accomplish the needed improvements to the north and south. The posted speed limit on all segments of the roadway is intended to be a uniform 56 kilometers (35 miles) per hour.

There are safety concerns for both pedestrians and vehicles related to existing roadway deficiencies. While overall there has been a decrease in the number of conflicts involving vehicles, and vehicles and pedestrians, along The Embarcadero between pre-earthquake years (1986-1988) and existing conditions (1991-1993)[3], there has been an increase at locations on The Embarcadero near Market Street and Washington Street.

With the removal of the elevated freeway, pedestrian activity has greatly increased along and across The Embarcadero. For example, the number of pedestrians observed using the crosswalk in front of the Ferry Building during a 15-minute noon-hour period increased by nearly 75 percent (230 to 400 persons) comparing pre- and post-earthquake conditions[4]. Along the Mid-Embarcadero roadway, crosswalks at intersections are not clearly marked and mid-block crossings are unsignalized. Surfaces of the sidewalks and the roadbed in the area have deteriorated and have been in need of resurfacing for several years.

The width and number of travel lanes at certain locations seem to encourage higher vehicle speeds, creating potential safety problems for pedestrians attempting to cross the roadway. The potential for problems is magnified at crosswalk locations where no signals exist and at intersections where vehicles are turning onto the Embarcadero roadway.

On the street network to the west of The Embarcadero, the introduction of more traffic at some locations subsequent to the Loma Prieta Earthquake has increased the likelihood for vehicular conflicts with each other and with pedestrians. In these areas, such as First Street, the project is intended to increase operating efficiency and roadway capacity where possible. Improvements are intended to reduce delays, improve safety and to provide more effective links to and from the freeway ramps. Traffic signals along The Embarcadero are also intended to be synchronized with light rail operations.

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[3] San Francisco Department of Parking and Traffic, accident logs for street segments, multiple intersections and alpha intersections for 1986, 1987, 1991, 1992 and 1993.

[4] Pedestrian counts taken at crosswalks and sidewalks along The Embarcadero in November 1992 and April 1993.

A goal of the City is to improve the street network in order to more efficiently move traffic through the area; help reduce safety hazards in the area; and enhance pedestrian, bicycle, and goods movement access along and to the waterfront. Such improvements include changes in lane configurations, crosswalk and sidewalk improvements, and new signalized intersections.

Non-motorized Circulation

The Mid-Embarcadero area is heavily used by pedestrians, particularly during the weekday mornings, afternoons and midday. In the morning and evening, commuters move between the San Francisco downtown and the ferry terminals at the Ferry Building and Pier 1/2. People make extensive use of the public open space in the area during lunchtime, using Justin Herman Plaza, the promenade south of the Ferry Building, Pier 7, and restaurants and bay-side access points. Midday is characterized by heavy pedestrian crossings of The Embarcadero at the Ferry Building, and at other nearby locations.

As previously discussed in the Roadway Deficiencies and Safety section, the existing pedestrian crosswalks are constrained by the current roadway and intersection configurations.

To improve pedestrian safety, the project intends to clearly delineate existing pedestrian crosswalks, to add crossing locations and to provide pedestrian signals. Correction of traffic deficiencies is intended to improve the safety of pedestrians within the study area as well. Consistent with the North and South Embarcadero projects, the waterfront promenade and sidewalks would also be widened, and surface materials would be repaired or replaced as necessary.

Bicyclists currently use the pedestrian promenade and parking lots adjacent to the roadway or share the curb lane with motor vehicles. The project intends to improve bicycle circulation by providing a 4.5 meter (15 feet) outside traffic lane the length of the Mid-Embarcadero roadway. The lane would be shared by bicyclists and motor vehicles during peak periods and by bicyclists and parked cars during off-peak periods.

Intermodal Integration

To meet San Francisco's transit policies and those of the region, the project is intended to enhance transit service and facilitate connections and transfers between modes. The F-Line, a surface light rail trolley, is planned to traverse the area, moving from Market Street to the median of The Embarcadero at north of Mission Street. Currently, the roadway alignment is not suitable for effectively incorporating light rail track and stations. Reconstruction of the surface roadway is intended to allow the integration of the planned F-Line in terms of both alignment and station locations in order to maximize its service potential.

Commuters using the ferries at Pier 1/2 and the Ferry Building can transfer to the MUNI trolley bus and diesel bus services which terminate at Steuart and Mission Streets, as well as the MUNI's California Street cable car line terminus at Market and Drumm Streets. One level below Market Street, MUNI's light rail subway accommodates five different lines reaching large parts of the City as well as serving the downtown. Below MUNI, the Bay Area Rapid Transit District (BART) provides rapid rail service west through San Francisco to Daly City and east under the Bay to cities in Alameda and Contra Costa Counties.

Transfers between these transit services and carriers are currently made difficult by the pedestrian and related traffic deficiencies previously noted. In addition, transit service along the waterfront, to both the north and south, is currently limited, creating a disincentive to use transit for trips to a variety of important destinations (e.g. the Fisherman's Wharf / Pier 39 commercial area). The project is intended to improve access to transit service throughout the project area. The project also intends to establish transit-only lanes in the vicinity of the Transbay Terminal in order to improve bus circulation and to improve High Occupancy Vehicle (HOV) access to the Bay Bridge/I-80 ramps.

Economic Vitality and Development

Accessibility is an important component of the economic viability of existing businesses as well as in the creation of new businesses. As discussed previously, the loss of the Embarcadero Freeway and the Terminal Separator Structure has resulted in congestion on certain downtown streets, particularly those west of The Embarcadero with direct access to the remaining freeway ramps. Slightly increased travel times (3-5 minutes) for employee and business-related vehicle trips from the regional freeway system to north of downtown has contributed to perceptions that access to the area is less convenient than it was before the earthquake. The lack of efficient surface transportation facilities -- which might substitute in part or in full for the service previously provided by the elevated freeways -- has further aggravated the problem. Overall, the combination of the freeway loss, limited Bay Bridge and U.S. 101 access points, deficiencies in local street conditions, and incomplete planned roadway and transit projects on the waterfront, has meant that important activity centers are perceived as less accessible than before the earthquake, including North Beach, Chinatown, Fisherman's Wharf, Pier 39, the Financial District, Embarcadero Center, and Golden Gateway. The project, when integrated with improvements to the North and South Embarcadero, and planned transit improvements, is intended to restore the lost transportation efficiency and improve accessibility and the perception of accessibility.

New economic development opportunities were created by the removal of the Embarcadero Freeway and the Terminal Separator Structure. The removal of these structures has made available large parcels of land. These parcels are adjacent to Broadway (between The Embarcadero and Sansome Street), at the Washington and Clay Street and Main and Beale Street ramp-heads, and along the seven blocks west of The Embarcadero, between Howard and Folsom Streets.

It is likely, since most of the parcels are not physically required for the replacement alternatives under consideration, that some of the parcels will be transferred, rezoned, or otherwise made available for other uses, including possible commercial development, thus generating property taxes, jobs, residences, and/or public services (dependent upon the ultimate rezoning and use). One goal of the project is to maximize the amount of land made available for such uses.

Urban Design Opportunities

The Northeast Waterfront Area Plan, completed in 1977 and subsequently adopted as an element of San Francisco's Master Plan, called for the removal of the Embarcadero Freeway to realize the potential of the open space and of the historic setting created by the Ferry Building and the foot of Market Street. In addition, the Plan called for reconstruction of The Embarcadero as a landscaped boulevard with light rail transit incorporated in the median.

The Plan sought transportation improvements which would serve as the catalyst for developing a series of parks and open spaces along the waterfront to improve the physical appearance of the roadway. This project is intended to provide opportunities for expanding and enhancing open spaces, recreation, and other public amenities, including views of and from the Ferry Building, which for over forty years were blocked by the presence of the freeway.

A detailed study of urban design considerations in the Mid-Embarcadero area is being conducted by the City. The plan can be expected to include a recommended treatment for the new urban plaza in front of the Ferry Building and a unifying landscape theme for the South, North and Mid-Embarcadero roadway.

No Build Conditions

By the year 2015, the general level of traffic in the project area is projected to increase by 15 percent in the AM peak period and by 10 percent in the PM peak period on typical weekdays. Congestion would occur at the same locations as it occurs today, although at worse levels. Traffic on the I-80/U.S. 101 freeway is projected to increase by about 10 percent within the project area. The projected increase in future traffic would raise the level of congestion near the ramps, especially in the peak direction. The effects of the No Build Alternative are discussed in detail in Section 4: Environmental Consequences and Mitigation Measures.

2. ALTERNATIVES

The purpose of this section is to describe the characteristics and development of transportation improvements being considered as alternatives to replacement of the Embarcadero Freeway and the Terminal Separator Structure (TSS), both of which were demolished as a result of damage sustained in the 1989 Loma Prieta Earthquake. Section 2.1 describes the process by which these alternatives were developed. Section 2.2 provides a description of the alternatives. The relationship between the proposed project and other "related" or reasonably foreseeable future projects is described in Section 2.3, along with other, more speculative future projects. Section 2.4 describes approval actions that would be required prior to implementation of the proposed project; and Section 2.5 describes alternatives which were considered during the process of developing alternatives, but which were found to be infeasible because of technical constraints or were eliminated from consideration because they would not meet the project's purpose and need as described in Section One.

Alternative Five, as described in this section, would require use of a portion of Justin Herman Plaza, a public park and Section 4(f) resource. This potential impact, along with modifications required to eliminate the impact, are discussed in Section 4.1 and in the attached Draft Section 4(f) Evaluation. Refer to p. 228 and to the Draft Section 4(f) Evaluation for a description of "Mitigated Alternative Five," which would be identical to the Alternative Five described below and in the impacts analysis in Section Four, except it would be realigned to avoid use of Justin Herman Plaza.

2.1 DEVELOPMENT OF ALTERNATIVES

The five project alternatives analyzed in this EIS/EIR evolved in two stages. Until December 1992, the City's planning effort focused on alternatives to replacement of the elevated Embarcadero Freeway that stood on the San Francisco waterfront, between Broadway and Folsom Street. It was assumed that the Terminal Separator Structure which connected the Bay Bridge and U.S. 101 to the Embarcadero Freeway, would be retrofitted or demolished and reconstructed in its original configuration. In December 1992, the Mayor of San Francisco requested that Caltrans postpone its plan for the Terminal Separator Structure and instead undertake with the City a study of alternatives to its full replacement. Following further study, the San Francisco Board of Supervisors requested the integration of alternatives to the

Embarcadero Freeway with alternatives to the TSS. The sections below describe this evolutionary process.

2.1.1 DEVELOPMENT OF ALTERNATIVES TO THE EMBARCADERO FREEWAY (1950-1992)

Even before its construction in the mid-1950s, the Embarcadero Freeway was a subject of contention and controversy. Plans for its construction were hotly debated in San Francisco forums, both with respect to whether or not it should be built, as well as with respect to its alignment and design. Upon completion of the section of the freeway between Broadway and Folsom Street, negative reaction from San Franciscans halted the planned extension of the elevated structure further north along the waterfront.

Planning for alternatives to replace the elevated freeway began long before the structure's actual demolition and removal in 1991. In the late 1970s, the Northeast Waterfront Area Plan, adopted as an element of the San Francisco Master Plan in 1977, was developed by the San Francisco Department of City Planning and consultants, in consultation with a citizens' committee. The Northeast Waterfront Area Plan called for a number of dramatic transportation and land use changes along The Embarcadero, including the removal of the Embarcadero Freeway and its replacement with a landscaped boulevard. Although the Northeast Waterfront Area Plan enjoyed community support leading to its adoption as an element of the City's Master Plan, lack of capital funding precluded implementation of its vision for The Embarcadero.

This situation changed in the early years of the next decade when San Francisco, the Governor of California, and the Metropolitan Transportation Commission (MTC) decided not to complete I-280 from its stub-end at Third Street (near Berry Street) to the Embarcadero Freeway near Howard Street. Provisions of federal law allowed for the "withdrawal" of this uncompleted segment from the federal Interstate System and, in turn, made available the federal funds which would have been used to construct the segment for use on alternative transit and highway projects in the area. The request for "withdrawal" of the I-280 segment was approved by the Federal government in early 1981. Consequently, San Francisco was in a position to pursue the implementation of the transportation elements of the Northeast Waterfront Area Plan, with approximately $80 million in federal assistance available. This funding was used for the (North and South) Embarcadero Roadway, I-280 ramp touchdown and removal, King Street improvements, CalTrain improvements, and TSM improvements.

With funding available, San Francisco, joined by Caltrans and MTC, accomplished a planning effort known as the I-280 Transfer Concept Program (I-280 TCP), which evaluated eight alternatives for integrated highway and transit improvements along the northeast waterfront. Reflecting the intention of the Northeast Waterfront Area Plan, five of those alternatives included removal of the Embarcadero Freeway, with or without a ramp connection from the Bay Bridge (I-80) and U.S. 101 to the Embarcadero surface roadway.

I-280 TCP planning concluded that the Embarcadero Freeway structure could be removed and replaced with a shorter system of ramps and surface street improvements if San Francisco was willing to incur higher levels of congestion on surface streets and at intersections in the area. A recommendation to pursue an I-280 TCP alternative which included the removal of the freeway was supported by the Mayor and approved by the Board of Supervisors in 1985. A proposition on the question of removing the freeway was subsequently placed on the San Francisco ballot, and the voters of the City determined that they wished to retain the freeway. The Embarcadero Freeway remained in service until October 17, 1989 when it suffered structural damage from the Loma Prieta Earthquake and was closed to all traffic.

In early 1990, the Mayor of San Francisco proposed that the damaged freeway be removed and replaced with ramps connecting the Terminal Separator Structure to the surface of The Embarcadero (near Mission Street). North of Mission Street, the Mayor proposed a subsurface roadway, facilitating uninterrupted traffic flow to and from Washington Street and Broadway. The Mayor's recommendation to seek the removal of the freeway and to pursue a replacement alternative, either on the surface or subsurface, was endorsed by the San Francisco Board of Supervisors in April 1990 (Resolution No. 262-90; April 16, 1990).

In February of 1991, the U.S. Secretary of Transportation committed $58.5 million of Federal Emergency Relief funding for preparation of environmental document, preliminary engineering, design and construction of a replacement to the Embarcadero Freeway, as long as the replacement "...would provide comparable service and accommodate the known corridor traffic demands for the Embarcadero Freeway." (Letter from Sec. Samuel K. Skinner to Mayor Art Agnos, dated February 7, 1991.) Commitments were also made by California Transportation Commission to fund the cost of removing the Embarcadero Freeway. The actions by the U.S. Secretary of Transportation and the California Transportation Commission provided a framework in which planning for the removal and replacement of the Embarcadero Freeway could begin. The San Francisco Department of City Planning and the Mayor's Office initiated a series of public meetings, leading to the creation of a Citizens Advisory Committee for the Embarcadero Project (CACEP). The CACEP provided a public forum for discussing the array of transportation, urban design, open space, and related concerns generated by the decision to remove the freeway. Demolition and removal of the freeway began in the summer of 1991, and was completed in November 1991.

During much of 1991, the CACEP, supported principally by staff from the Departments of Public Works and City Planning, and the Mayor's Office, sought to reach agreement on project objectives and on a set of replacement alternatives. In October 1991, the CACEP set forth its "Urban Design and Transportation Recommendations", which provided guidance to subsequent planning work on the replacement project.

In January 1992, at the request of the Mayor, the City's Chief Administrative Officer (CAO) assumed responsibility for management of the planning process. The CAO placed the project management responsibility within the existing Waterfront Transportation Projects Office, and provided for policy direction through a Policy Steering Committee (PSC), comprised of the heads of ten City departments, chaired by the CAO, and supported by a Technical Advisory Committee (TAC) made up of corresponding department staff.

In August 1992, the TAC and the CACEP presented their recommendations on project alternatives to the Policy Steering Committee. The PSC made a preliminary selection of five broadly-defined alternatives for inclusion in an EIS/EIR analyzing the project, which became known as The Mid-Embarcadero Roadway Replacement Project. These five alternatives included the following:

- A "No Build" alternative, which would have basically perpetuated the conditions that existed in late 1992 on The Embarcadero between Folsom Street and Broadway.
- A realigned four-to-six-lane Embarcadero surface roadway between Folsom Street and Broadway, with no ramp connection to the Terminal Separator Structure.
- A realigned six-to-eight-lane Embarcadero surface roadway between Folsom Street and Broadway, with a ramp connection to the Terminal Separator Structure.

- A partially subsurface six-to-eight-lane roadway, with links to downtown at Washington Street, and to the North Embarcadero, with a ramp connection to the Terminal Separator Structure.

- A partially subsurface six-to-eight-lane roadway connection to the North Embarcadero only, with a ramp connection to the Terminal Separator Structure.

All of the alternatives assumed that Caltrans would demolish and rebuild the TSS within its original alignment. Narrative and graphic descriptions of the five alternatives selected by the PSC were included in an information package distributed for public review and comment as part of the "scoping" process for the Mid-Embarcadero EIS/EIR. A notice of intent and a notice of preparation were prepared, published, and distributed, and a Scoping Meeting was held on September 14, 1992, to provide the public an opportunity to comment on the recommended alternatives and the scope of the EIS/EIR. The officially noticed public comment period ended on September 30, 1992.

With one exception, comments and suggestions received from the public at the Scoping Meeting or during the comment period did not suggest any general concepts which were not represented in the five alternatives set forth by the PSC, or which had not been previously considered during the public (CACEP) development process. The only exception was a proposal to build a single-level, twenty-foot-high elevated roadway from the Terminal Separator Structure to Broadway, following essentially the same alignment of the former Embarcadero Freeway. This proposal conflicted with one of the primary objectives of the project, which was to retain the visual and physical access to the waterfront that was gained with removal of the Embarcadero Freeway. (See further discussion in Section 2.5.)

There were, however, concerns expressed in the comments from the public regarding the amount of auto traffic, potential visual impacts, and pedestrian safety of a wide surface roadway. Consequently, an option for a narrower roadway was included in the analysis of the Mid-Embarcadero roadway alternatives which began in September 1992. Also, in response to fourteen comments which urged that a replacement for the TSS not be built, two of the five Mid-Embarcadero roadway alternatives were studied under the no TSS assumption as well. Following scoping process, City staff, along with a multi-disciplinary team of consultants began preparation of technical studies leading to an EIS/EIR.

2.1.2 DEVELOPMENT OF ALTERNATIVES TO THE TERMINAL SEPARATOR STRUCTURE (1992-1993)

At the time of the Mid-Embarcadero Scoping Meeting, Caltrans planned to demolish and remove the earthquake-damaged Terminal Separator Structure, and then to construct a replacement structure with nearly identical functions and configuration (ramp locations and alignment) as the one removed. Demolition of the TSS began in late 1992 and was completed by September 1993. Caltrans was prepared to advertise the bid for the reconstruction contract in June 1993.

In December 1992, the Mayor of San Francisco requested that Caltrans hold in abeyance its plan for the reconstruction of the Terminal Separator Structure and instead cooperate with the City to examine alternatives to an in-kind replacement of the Terminal Separator Structure, as well as alternative replacement facilities for the Transbay Terminal (letter from Mayor Jordan to General James van Lobensels, Caltrans Director, dated December 17, 1992). On March 22, 1993, the San Francisco Board of Supervisors unanimously passed a resolution (No. 229-93) requesting that Caltrans work with the City to study alternatives to reconstruction of the Terminal Separator Structure and rehabilitation of the Transbay Terminal. Caltrans agreed to postpone the reconstruction bid process for the TSS replacement structure until September 1, 1993 to provide the City an opportunity to look at alternatives to full replacement of the structure.

In April 1993, the Mayor's Task Force for Terminal Separator Structure/Transbay Terminal, under the lead of the Department of City Planning and the Mayor's Office, initiated a study to identify alternatives for the TSS replacement; establish transit parameters for the potential replacement of the Transbay Terminal; and develop a preliminary land use approach for rezoning properties that may become available as a result of the removal of the transportation facilities. Assisted by Caltrans staff, and working closely with an ad hoc Citizens Advisory Committee, the Task Force evaluated more than twenty proposals for the TSS replacement, and by July 1993, had identified seven viable alternatives, ranging from full rebuild to modified rebuild and construction of alternative ramps (Terminal Separator Structure/Transbay Terminal: Report to the Mayor, July 26, 1993). The principal finding of the Task Force study with respect to TSS was that there were alternatives to a full replacement which may adequately serve San Francisco.

2.1.3 INTEGRATION OF MID-EMBARCADERO AND TSS ALTERNATIVES (1993-1994)

As a result of the Task Force study cited above, the City requested from Caltrans another delay in advertising the bid for reconstruction of the TSS until February 1994, so that the identified alternatives could be evaluated in conjunction with those being analyzed for the Mid-Embarcadero Roadway Replacement Project. In August 1993, the San Francisco Board of Supervisors directed the staff by Resolution 668-93 to undertake a transportation study of alternatives to the full rebuild of the TSS and report back to the Board no later than February 23, 1994.

With funding and staff assistance from FHWA and Caltrans, the City staff completed the transportation study of the TSS alternatives in late January 1994. The study examined the potential traffic and transit impacts of six TSS/Mid-Embarcadero alternatives which represented logical physical and functional combinations of the Mid-Embarcadero alternatives and TSS alternatives. The six TSS/Mid-Embarcadero alternatives included the following:

- A " No Build" alternative which would essentially maintain the street network and ramp connections that currently exist in downtown San Francisco.
- A realigned four-to-six-lane Embarcadero surface roadway with no new on- or off-ramps to the freeway.
- A realigned four-to-six-lane Embarcadero surface roadway with a new on-ramp to westbound I-80 and southbound U.S. 101 at Essex and Harrison Streets. A new eastbound I-80 off-ramp would be built touching down on Second Street between Harrison and Bryant Streets. The Fremont Street off-ramp would be modified to allow traffic access to Folsom Street.
- A realigned four-to-six-lane Embarcadero surface roadway with modifications to the existing Fremont Street off-ramp to allow traffic access to Folsom Street. No new on- or off-ramp to the freeway would be constructed.
- A realigned six-to-eight-lane Embarcadero surface roadway with in-kind replacement of the TSS, including the Main Street / Beale Street ramps and the ramp connection to The Embarcadero.

- A partially subsurface Embarcadero roadway with in-kind replacement of the TSS, including the Main Street/Beale Street ramps and the ramp connection to The Embarcadero. The northbound lanes of The Embarcadero would be below-grade between Mission and Washington Streets. The southbound lanes would remain at the surface.

The longer of the two partially subsurface roadway alternatives considered for the Mid-Embarcadero Roadway Replacement Project was not included in the six TSS/Mid-Embarcadero alternatives, because detailed analysis carried out for the Mid-Embarcadero alternatives identified technical constraints to its construction and operation. (See further discussion in Section 2.5).

On February 14, 1994, the San Francisco Board of Supervisors adopted Resolution 99-94 accepting the transportation study report which indicated that there are alternatives to the full rebuild of the TSS which would provide efficient transportation services, and advising Caltrans that the City was not supportive of any further efforts to rebuild the TSS. By the same Resolution, the Board directed the City staff to proceed with a scoping meeting and to work with FHWA and Caltrans to combine the environmental documentation for the TSS and the Mid-Embarcadero projects.

Because the combination of the two projects had the potential to drastically affect the scope of the EIS/EIR, a revised notice of intent and notice of preparation were prepared and another Scoping Meeting was held. Narrative and graphic descriptions of seven alternatives were included in an information package distributed for public review and comment as part of the "scoping" process for the TSS/Mid-Embarcadero alternatives. The seven alternatives included the six alternatives described above and a new alternative which proposed that the northbound lanes of The Embarcadero would be below-grade between Mission and Washington Streets, and that the southbound lanes would curve to the west, creating a plaza in front of the Ferry Building.

The scoping meeting for the combined project was held on February 28, 1994, to provide the public an opportunity to comment on the proposed alternatives and on the scope of the EIS/EIR. The official public comment period ended on March 21, 1994.

After the scoping meeting and scoping period, comments and proposals were evaluated by City staff. As a result, some alternatives were eliminated, some were refined to respond to public concerns, and a new alternative was identified for further consideration and then eliminated following completion of a preliminary traffic analysis. The alternatives analyzed in this EIS/EIR are described below. Alternatives considered but rejected from further consideration are described in Section 2.5.

The current environmental analysis was underway prior to federal requirements for a " Major Metropolitan Transportation Investment Study"(MMTI). As a result, and in conformance with 23 CFR 450.318(i), City staff consulted with the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), and with local transit providers. At a meeting on August 24, 1994, City staff described the development of current project alternatives, along with ways in which the alternatives would both accommodate existing transit services and facilitate planned transit improvements. Thus it was determined that a detailed Major Investment Study (MIS) was not required. (See Appendix D for further documentation.)

2.2 ALTERNATIVES DESCRIPTION

Five basic alternatives are analyzed in this EIS/EIR; they include a "No Build" alternative and four "Build" alternatives. Two of the "Build" alternatives include variations in the proposed treatment for the I-80 eastbound off-ramp from the Peninsula.

The descriptions below are based on conceptual engineering plans for each alternative developed by the San Francisco Department of Public Works. Additional design and engineering work would be required prior to implementation of any of the alternatives, and the final designs could differ slightly from conceptual plans presented here. While the San Francisco Department of Public Works would be responsible for design, engineering, and construction of any changes to the Embarcadero roadway, it has not been determined whether Caltrans or the San Francisco Department of Public Works would be responsible for design, engineering, and construction of any changes to Caltrans facilities such as freeway on- and off-ramps. Caltrans approval would be required for all such changes.

2.2.1 ALTERNATIVE ONE: NO BUILD

The No Build Alternative does not propose any project-related construction for the project area. No on- or off-ramps to the freeway would be constructed, and no operational or surface street improvements would be implemented. The planned MUNI F-Line alignment would be accommodated in the Embarcadero surface roadway median and other planned transit facilities would be accommodated, but as separate projects (see Section 2.3).

The six-lane Embarcadero surface road, which was partially under the former freeway structure, would remain in its pre-earthquake and existing alignment between Howard Street and Broadway. The northbound roadway would continue to run parallel to and on the east side of the former freeway alignment. The southbound roadway would continue to follow a more circuitous path, weaving in and out of where former freeway support columns were. The parking area that was under the former freeway structure (between Howard Street and Pier 3) would remain in the roadway median, separating the northbound roadway from the southbound roadway, although construction of the MUNI F-Line would require a reconfiguration of the parking spaces. (See Figures 2-1 and 2-1A.)

There would continue to be three continuous lanes in each direction on The Embarcadero between Howard Street and Broadway. In addition, there would continue to be a fourth lane in the northbound direction from Washington Street to Pier 3, and from Pier 5 to Broadway. (Some of these lanes have been temporarily closed, and traffic has been temporarily rerouted for construction of the MUNI Metro Turnback described in Section 2.3. This section describes conditions as they are without construction activities.) Currently permitted U-turn movements would be prohibited in the No Build Alternative due to the presence of the MUNI F-Line, but two of the four lanes approaching Broadway would remain left-turn lanes. Curb-side parking would still be allowed in the northbound direction from the Ferry Building to Pier 7, and in the southbound direction between Washington Street and Broadway, and between Mission and Folsom Streets. The surface parking areas immediately fronting the Ferry Building would remain.

Between Folsom and Howard Streets, The Embarcadero would be realigned to the west to conform with the South Embarcadero alignment and Steuart Street would be closed between Folsom and Howard Streets, but as separate projects. The southbound lanes would be realigned in the MUNI Metro Turnback project, which is under construction (see Section 2.3). Should the No Build Alternative be selected, the northbound lanes would be realigned under another separate City project to connect with the South Embarcadero roadway. The realignment of the northbound lanes was addressed in the Environmental Assessment for the South Embarcadero Project.

Improvements Included in this Alternative

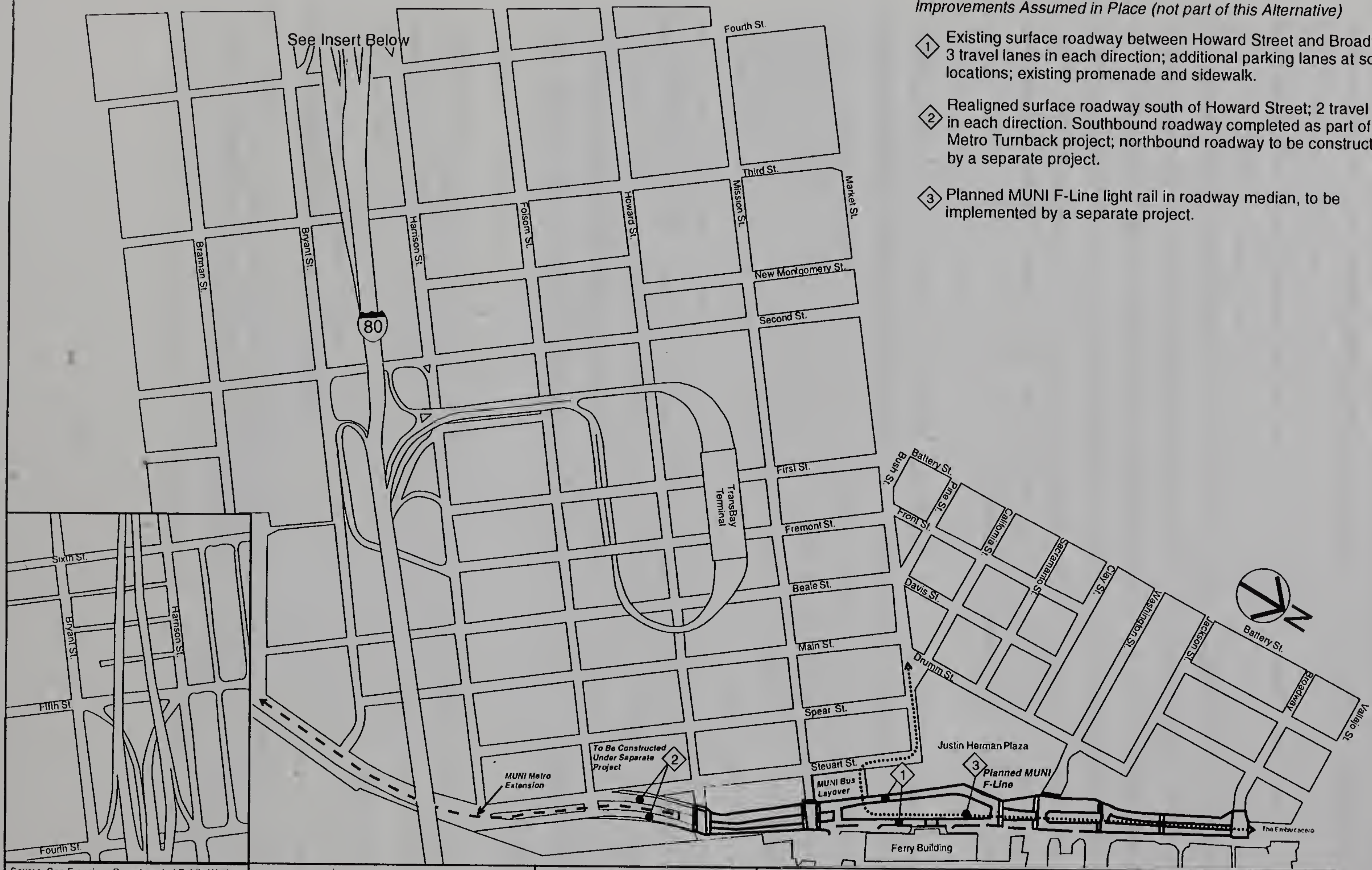
None Proposed.

Improvements Assumed in Place (not part of this Alternative)

① Existing surface roadway between Howard Street and Broadway; 3 travel lanes in each direction; additional parking lanes at some locations; existing promenade and sidewalk.

② Realigned surface roadway south of Howard Street; 2 travel lanes in each direction. Southbound roadway completed as part of MUNI Metro Turnback project; northbound roadway to be constructed by a separate project.

③ Planned MUNI F-Line light rail in roadway median, to be implemented by a separate project.

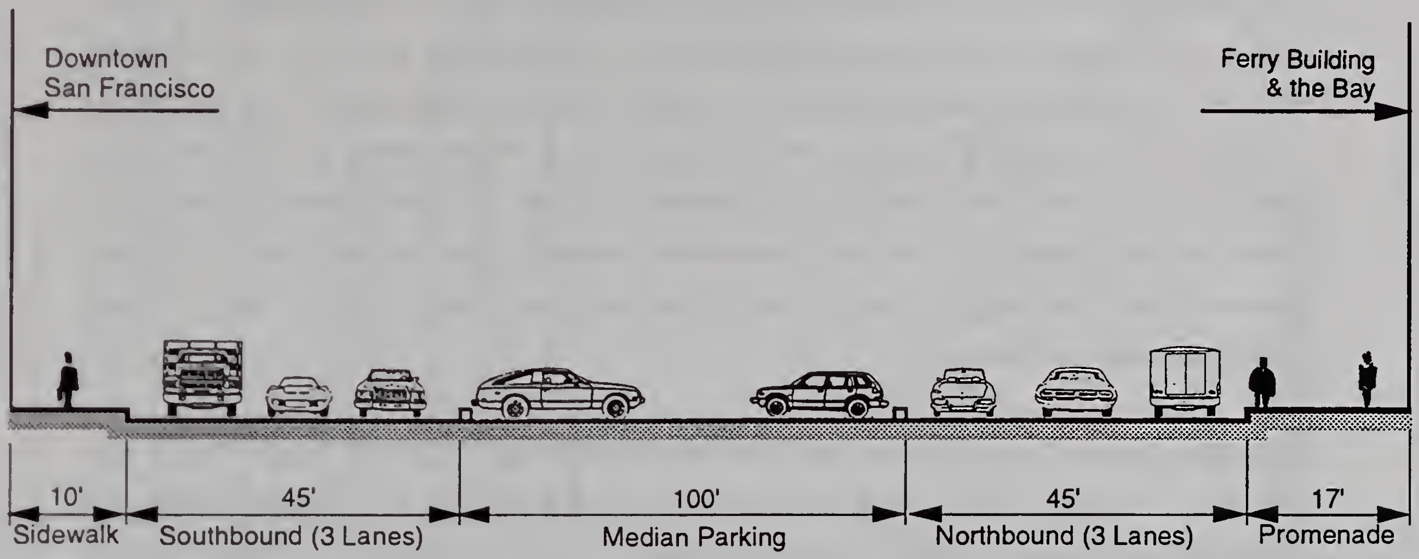


Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

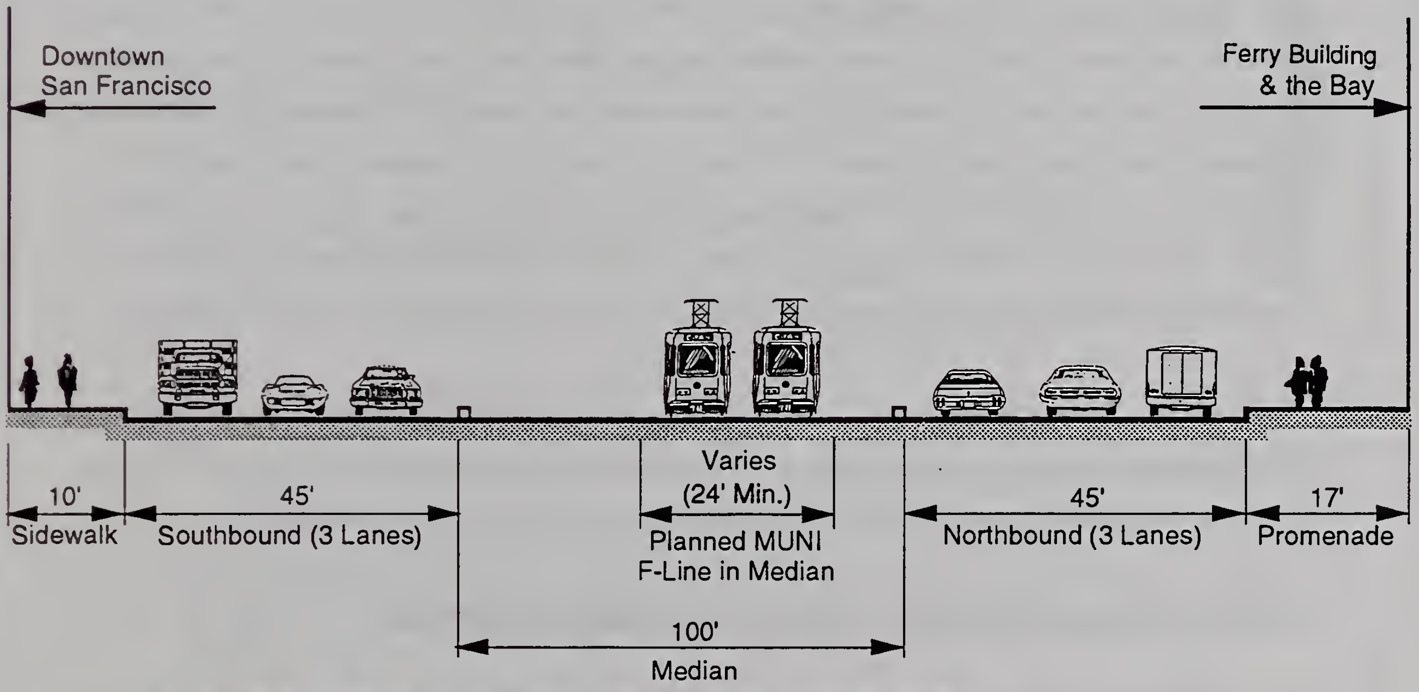
92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE ONE
No Build

Figure 2-1



a. Embarcadero Roadway, at Market Street under Existing Conditions



b. Embarcadero Roadway, at Market Street under Alternative 1: The No Build

Source: Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

Existing Conditions and Alternative 1 No Build
Typical Sections

Figure 2-1A

The intersections of The Embarcadero with Folsom, Howard, Mission, and Washington Streets, and with Broadway, are currently signalized and would remain so under the No Build Alternative. Pedestrian crosswalks would also remain at these intersections. There is currently no direct vehicular access between The Embarcadero and Market Street; but a traffic signal exists in front of the Ferry Building for pedestrians crossing The Embarcadero at that point. There are also unsignalized, mid-block pedestrian crossings at the northern end of the Ferry Building (near Clay Street), in front of Pier 3 (Jackson Street), and in front of Pier 5. These conditions would be maintained.

Pedestrian facilities exist on both sides of The Embarcadero, between Folsom Street and Broadway. Presently, the sidewalk on the land side of the roadway has a varying width: 6.7 meters (22 feet) between Folsom and Howard Streets, 5.2 to 6.1 meters (17 to 20 feet) between Howard and Mission Streets, 6.1 meters (20 feet) in front of the MUNI bus layover area, 3.1 meters (10 feet) through the Justin Herman Park and Plaza area, 1.2 meters (4 feet) along the edge of the open space between Clay and Washington Streets, 3.1 to 6.1 meters (10 to 20 feet) between Washington and Jackson Streets, and 6.7 meters (22 feet) between Jackson Street and Pacific Avenue. A raised sidewalk does not exist north of Pacific Avenue, but there is a 2.4-meter (8-foot) paving area for parking meters and pedestrian use. The sidewalk on the bay side of the roadway, which is referred to as the promenade, is presently 7.6 meters (25 feet) wide between Folsom and Howard Streets, 3.8 meters (12.5 feet) wide between Howard and Mission Streets, 3.1 to 5.2 meters (10 to 17 feet) wide in the Ferry Building area, and 4.5 to 5.2 meters (15 to 17 feet) wide north of the Ferry Building. Between Howard Street and Broadway, the promenade and sidewalk would remain in their current locations, with their current dimensions.

The realigned Embarcadero roadway between Folsom and Howard Streets (to be constructed under separate projects) would include a 7.6-meter-wide (25-foot-wide) promenade on the bay side and a 4.5-meter-wide (15-foot-wide) sidewalk on the land side of the roadway.

2.2.2 ALTERNATIVE TWO: MID-EMBARCADERO ROADWAY

This alternative would realign and upgrade the surface roadway along the section of The Embarcadero between Folsom Street and Broadway as a four-to-six-lane roadway, to match the roadway to the north and south. No new freeway on- or off-ramps would be constructed, although some operational and surface street improvements would be implemented. (See Figures 2-2, 2-2A, and 2-2B.)

Improvements Included in this Alternative

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

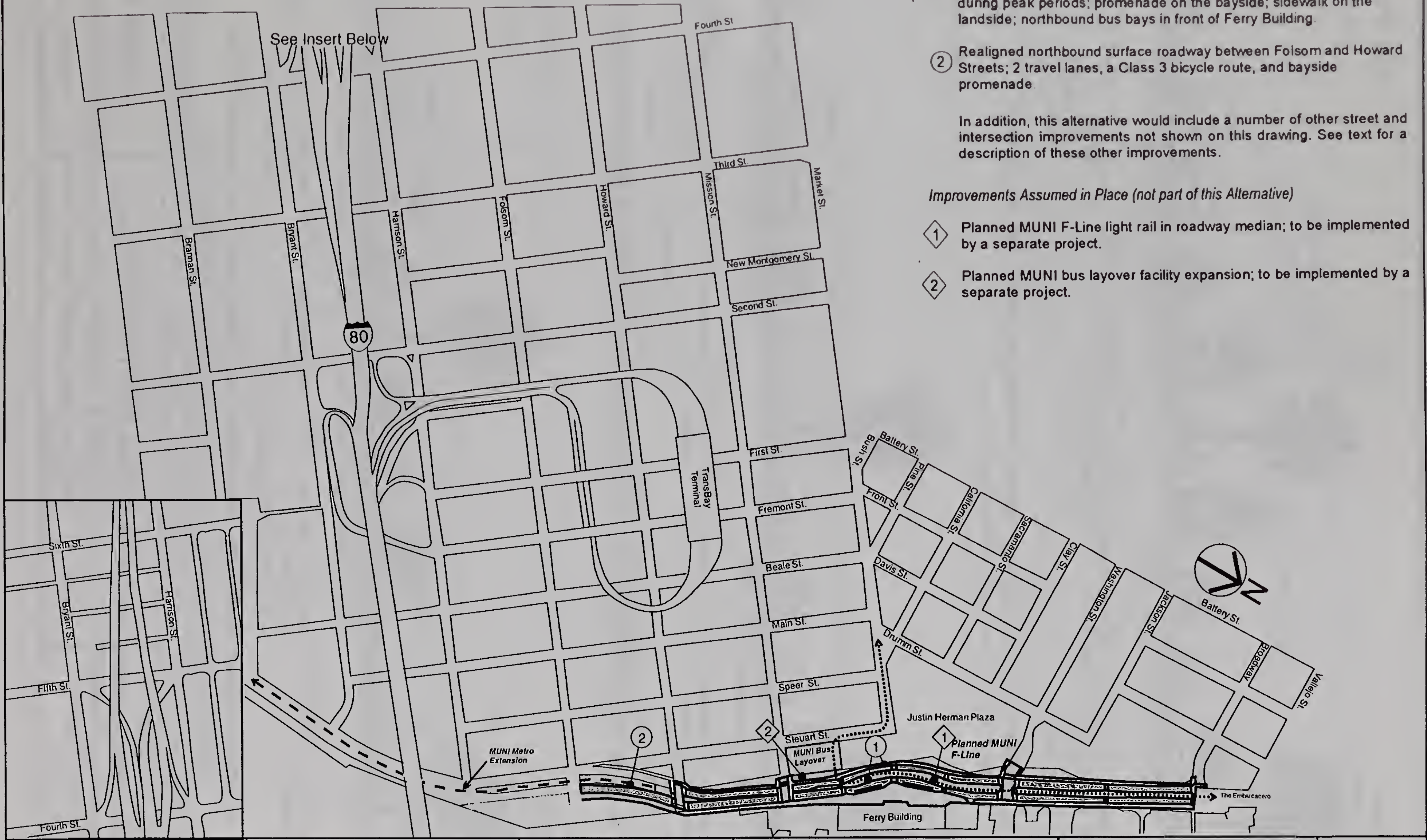
② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, a Class 3 bicycle route, and bayside promenade.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

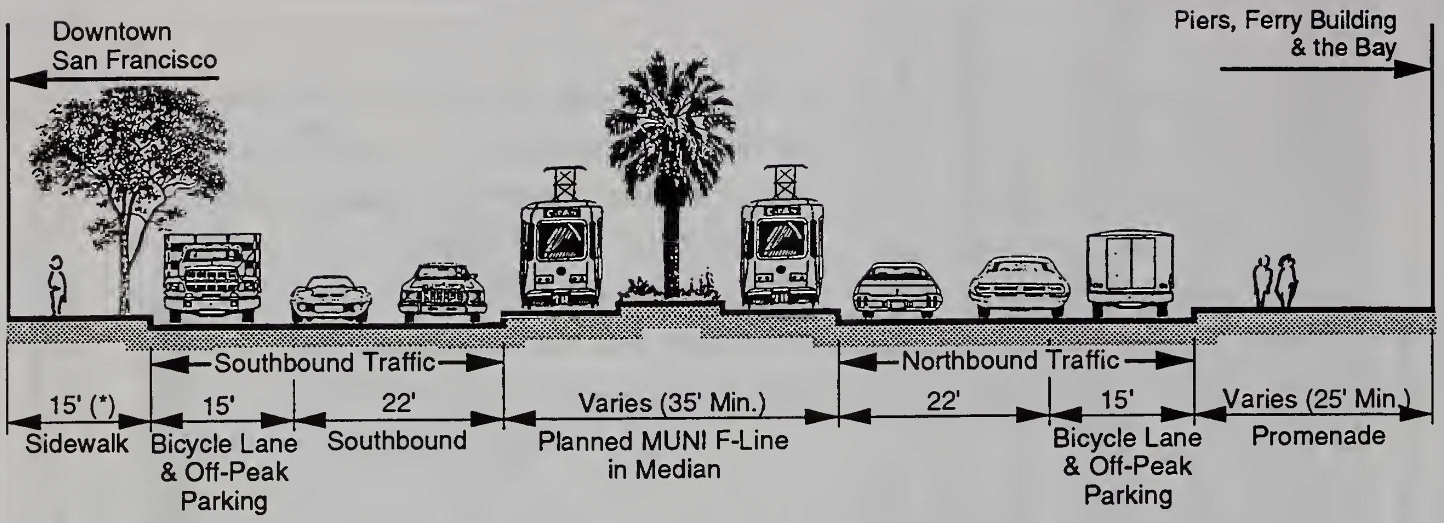
LEGEND

GRAPHIC SCALE

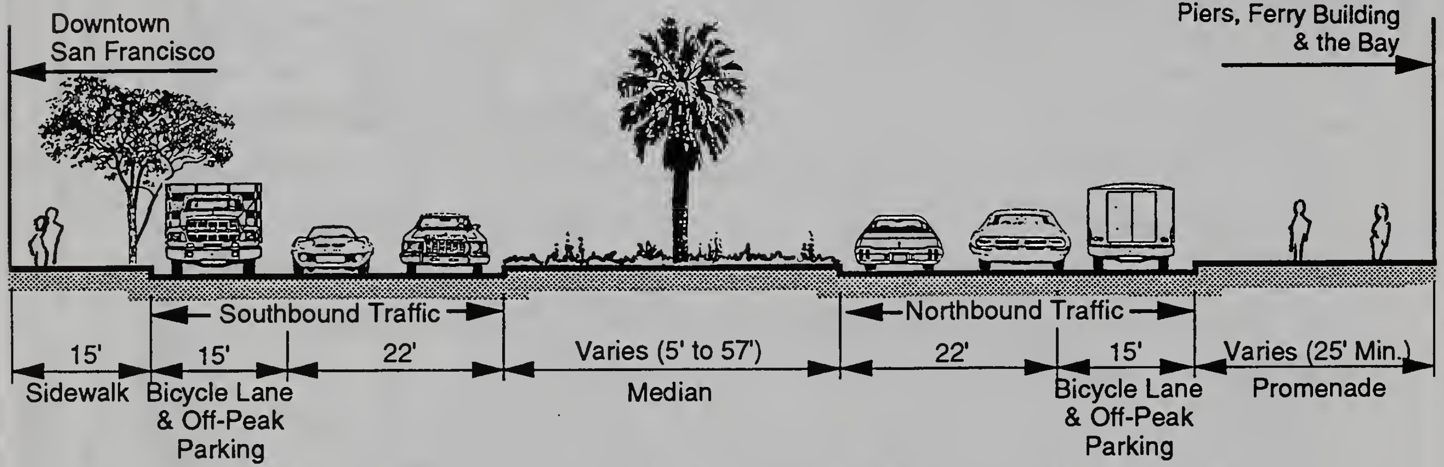
92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE TWO
Mid-Embarcadero Roadway

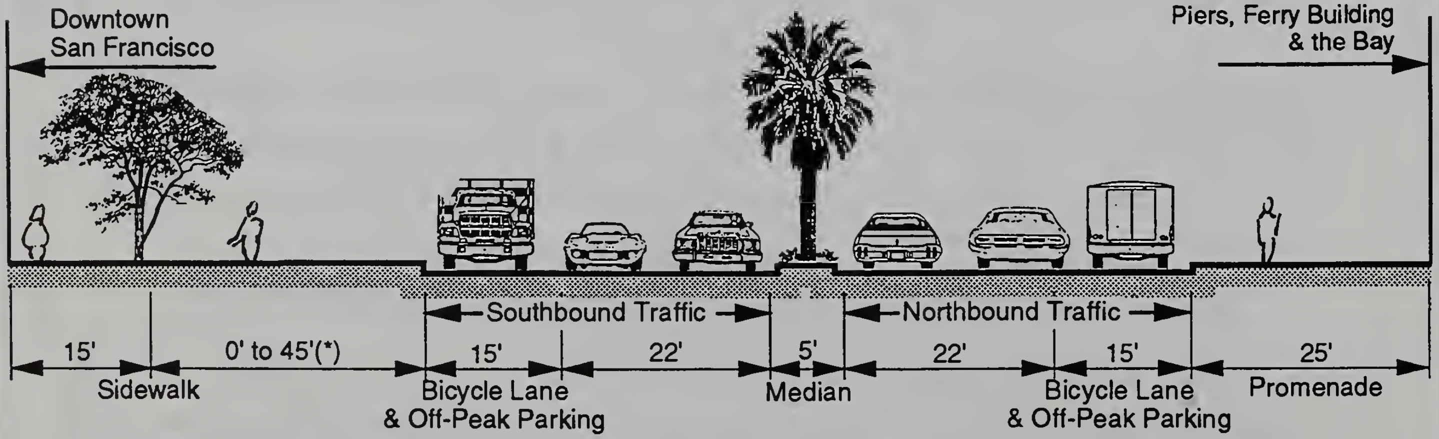
Figure 2-2



a. Embarcadero Roadway, North of Market Street (to Broadway)
* Reduced to 6' at just south of Broadway



b. Embarcadero Roadway, from Market Street south to Mission Street

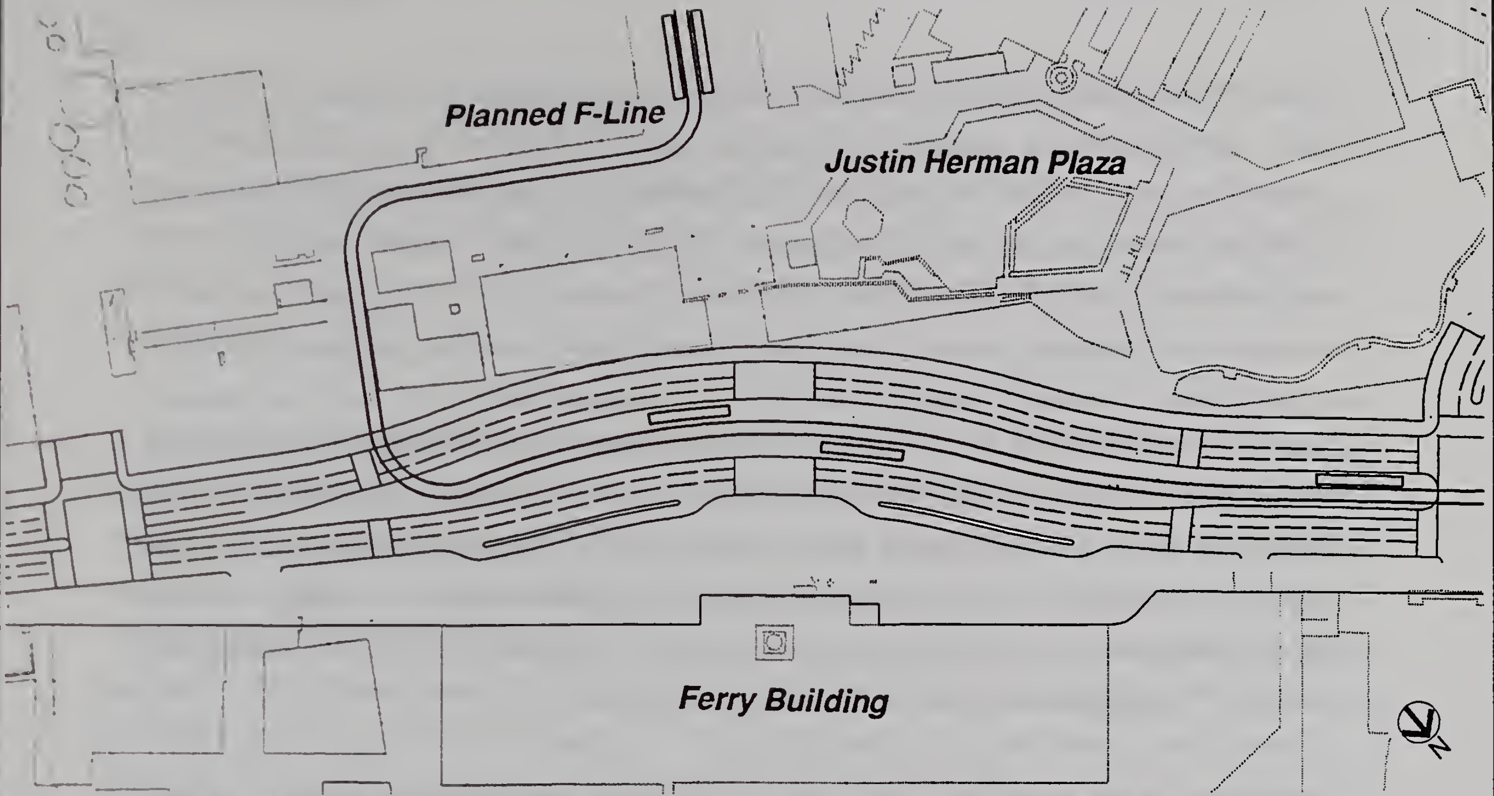


c. Embarcadero Roadway, from Mission Street south to Howard Street
* Widened sidewalk area would be converted to off-street parking as feasible

Source: Parsons Brinckerhoff Quade & Douglas, Inc.

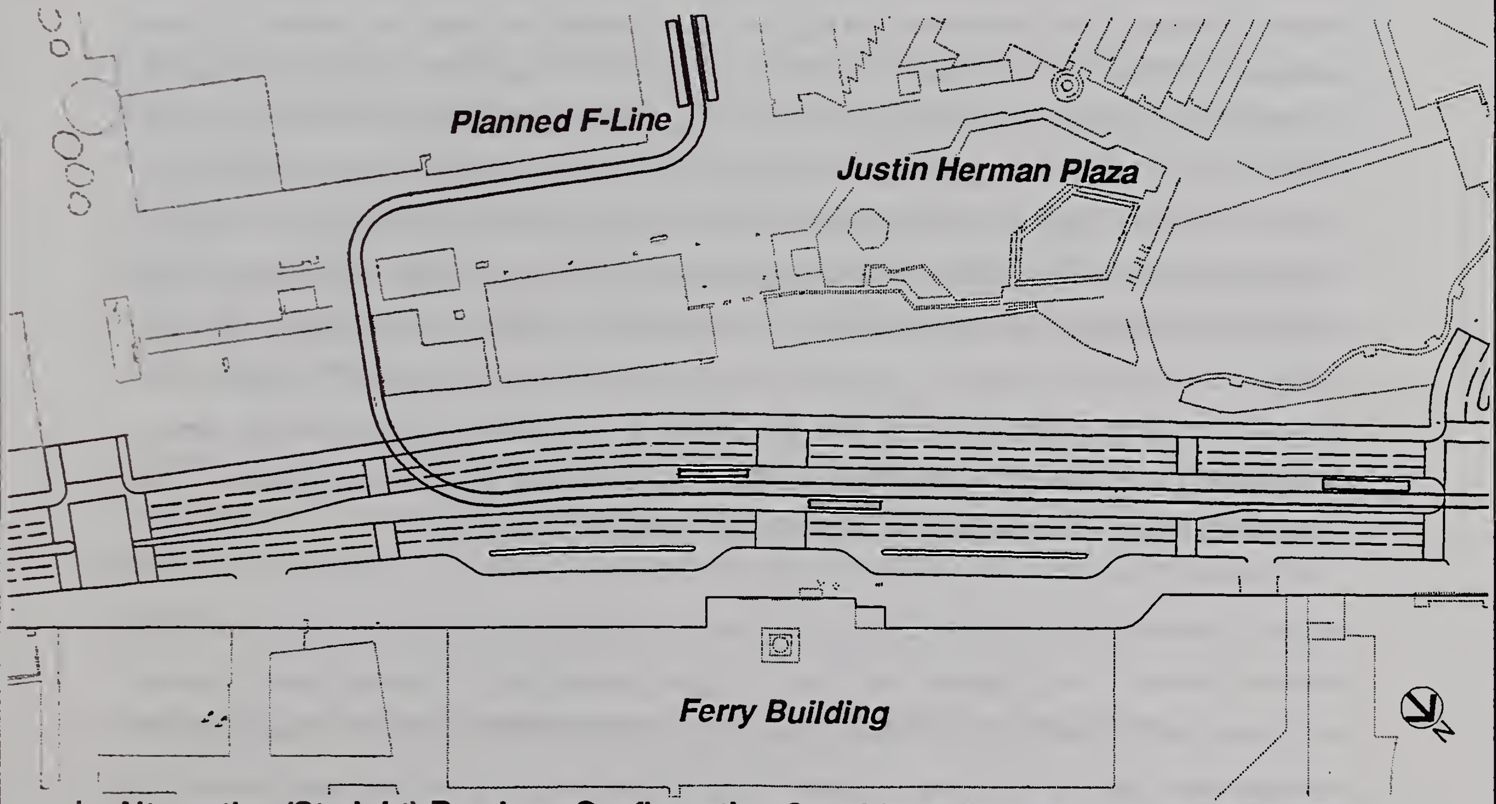
Note: Landscape features are schematic only.

92.202E & 94.060E **Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure**	**All Build Alternatives** **(2, 3, 4, and 5)** **Typical Sections**	**Figure 2-2A**



a. Current Proposed Roadway Configuration in Front of the Ferry Building
Alternatives 2, 3, and 4

Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.



b. Alternative (Straight) Roadway Configuration Considered for in Front of the Ferry Building
Alternatives 2, 3, and 4

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator	Embarcadero Roadway Configuration in Front of Ferry Building Alternatives 2, 3, and 4	Figure 2-2B

The new Embarcadero roadway would begin at the present intersection of Steuart and Folsom Streets, and would curve eastward (towards the Bay) to meet the existing Embarcadero alignment at Howard Street. The area east of the roadway, including the existing Embarcadero right-of-way, would become part of the planned Rincon Point Park. Steuart Street would be closed to through traffic between Folsom and Howard Streets, as in the No Build Alternative. The southbound roadway between Folsom and Howard Streets would be completed as part of the MUNI Metro Turnback project in late 1996. A realigned northbound roadway between Folsom and Howard Streets and a new promenade would be constructed under this alternative. The replacement roadway would have two through lanes and a left-turn lane. The curb lane would be 4.5 meters (15 feet) wide to accommodate motor vehicles and a Class Three bicycle route. (A Class Three bicycle route is a continuous pavement width, 1.2 meters (4 feet) minimum, designated for bicycle use by special signs, rather than by pavement striping and markings.) The promenade would be 7.6 meters (25 feet) wide.

Between Howard Street and Broadway, the northbound lanes of the new Embarcadero roadway would generally follow the alignment of the existing roadway, except in front of the Ferry Building the roadway would curve slightly towards west to create a wider promenade. The precise alignment of the roadway in front of the Ferry Building has been the subject of much discussion at citizens meetings and has evolved as shown in Figure 2-2B. Since the variations are extremely minor (about 15 meters (50 feet) one way or the other), the San Francisco Board of Supervisors and the Port Commission could adopt the current proposed configuration, with a slight curve away from the Ferry Building, or the earlier, straight configuration with no consequences in terms of potential environmental impacts (i.e., both configurations would have identical or substantially similar impacts). The southbound lanes of the roadway would run parallel to the northbound lanes. Existing median parking would be removed. Between the southern end of the Ferry Building and Broadway, a 17.4-meter (57-foot) median would accommodate the planned MUNI F-Line historic trolley line and landscape amenities. The median would be narrower south of Mission Street due to site constraints.

Between Howard Street and Broadway, the new Embarcadero roadway would have three continuous lanes in each direction, with the curb lane convertible to a parking lane in the off-peak hours (see Figure 2-2A). The parking/traffic lane would be 4.5 meters (15 feet) wide to accommodate motor vehicles and a Class Three bicycle route. Additional lanes would be provided at intersections for turning movements. At Broadway, there would be two through lanes and two left-turn lanes on The Embarcadero in the northbound direction. At Washington

Street, there would be three through lanes and a left-turn lane in the northbound direction, and three through lanes and a U-turn lane in the southbound direction. At Mission Street, there would be three through lanes and a U-turn lane in the southbound direction. The southbound U-turn lanes would allow access to the northbound lanes for vehicular access to the Ferry Building and piers. There would be two bus bays off the northbound roadway, in front of the Ferry Building.

In this alternative, the pedestrian promenade would be 7.6 meters (25 feet) wide between Folsom and Mission Streets and 7.6 to 15.2 meters (25 to 50 feet) wide in front of the Agriculture Building. The current parking lots north and south of the Ferry Building entrance would be removed to provide a promenade width of 18.3 to 33.5 meters (60 to 110 feet) through the Ferry Building area. North of the Ferry Building, the promenade would be 7.6 to 10.7 meters (25 to 35 feet) wide. The sidewalk would be 4.5 meters (15 feet) wide from Mission Street to just south of Broadway, where it would be narrowed to 1.8 meters (6 feet). Between Mission and Howard Streets, the roadway alignment would allow an expanded sidewalk of 4.5 to 18.3 (15 to 60 feet) in width. A portion of the expanded sidewalk area would be converted to off-street parking where feasible.

As with the No Build Alternative, all intersections of the reconstructed Embarcadero roadway would be at-grade and signalized, including: Folsom, Howard, Mission, and Washington Streets and Broadway. Market Street would remain closed to vehicular traffic to and from The Embarcadero and the signal there would be available to pedestrians and the MUNI F-Line. This alternative would add signalized, mid-block pedestrian crossings of The Embarcadero between Mission and Market Streets, between Market and Washington Streets, and between Washington Street and Broadway.

In addition to the characteristics described above, Alternative Two and all other build alternatives would implement a package of operational and surface street improvements to facilitate traffic flow and access to and from the freeway. These improvements would include the following:

Street and Operational Improvements Common to All Build Alternatives

- Washington Street would be restriped between Drumm Street and The Embarcadero to provide two travel lanes in each direction (as opposed to one wide lane in each direction currently). Washington Street would intersect the Embarcadero directly across from Pier One.

- A new left-turn pocket would be provided on northbound Drumm Street at Washington Street.

- Drumm Street would be restriped north of Washington Street for two northbound lanes (as opposed to one wide lane currently).

- The eastbound approach of Bryant Street would be widened between Main Street and The Embarcadero to incorporate two left-turn-only lanes and a transit lane with right turns allowed. (Bryant Street currently provides two eastbound lanes at this location.)

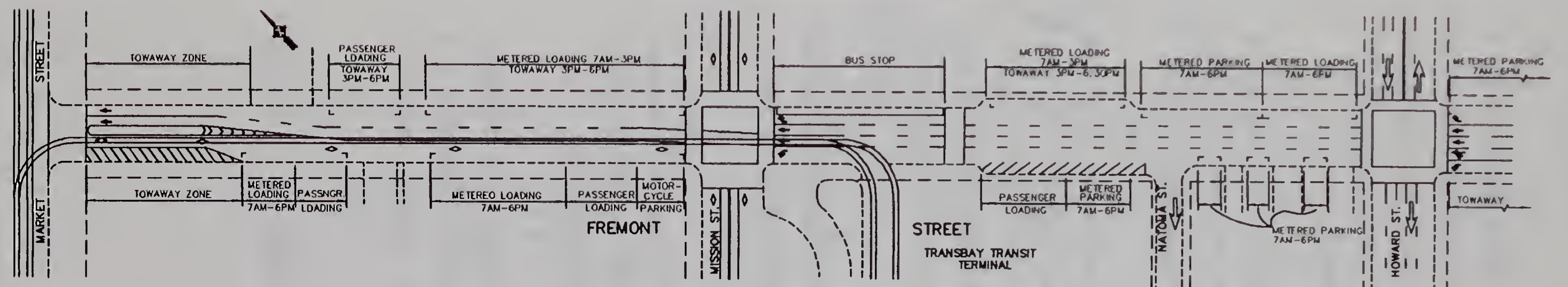
- The eastbound approach of Folsom Street at Second Street would be restriped to provide an exclusive left-turn lane, four through lanes, and an exclusive right-turn lane. (Folsom Street currently provides four lanes at this location.)

- Fremont Street would be restriped to include an additional mixed-flow through lane from the I-80 westbound off-ramp at Harrison Street to and across Market Street. (Fremont Street currently has four mixed-flow lanes from Howard to Mission Streets and two mixed-flow lanes and a transit-only lane from Mission to Market Streets.) The current two-way segment between Folsom and Harrison Streets would remain two-way operation. At Mission Street, there would be three through lanes, one left-turn-only lane and one right-turn-only (transit excepted) lane. At Market Street, there would be a left curb transit-only lane, a transit island, and three through lanes. The left-most through lane pavement includes the F-Line transit tracks (see Figure 2-2C).

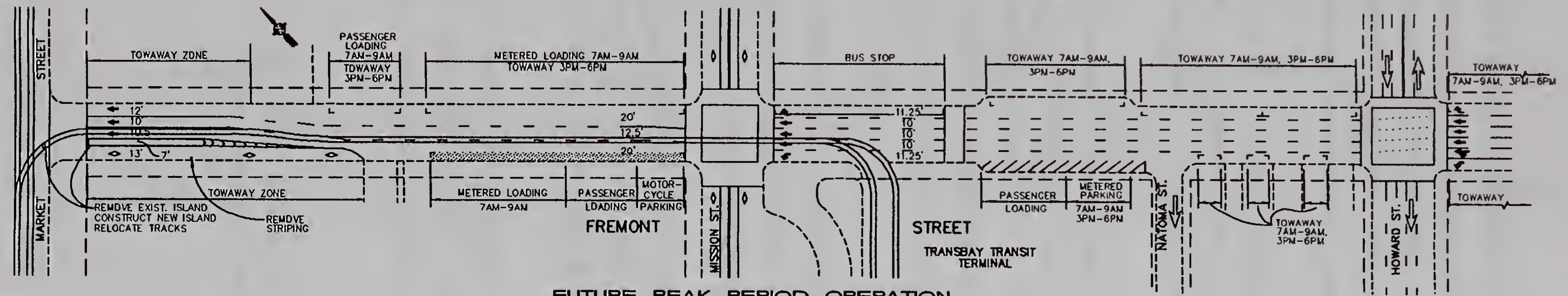
- Front Street between Market Street and Pine Street would be restriped to four lanes: two left-turn-only and two through lanes. (Front Street currently has two wide lanes.)

- An additional mixed-flow through lane would be provided on Bush Street during the PM peak period between Montgomery Street and Battery Street by removing parking on the right side (the extra lane is already provided during the AM peak).

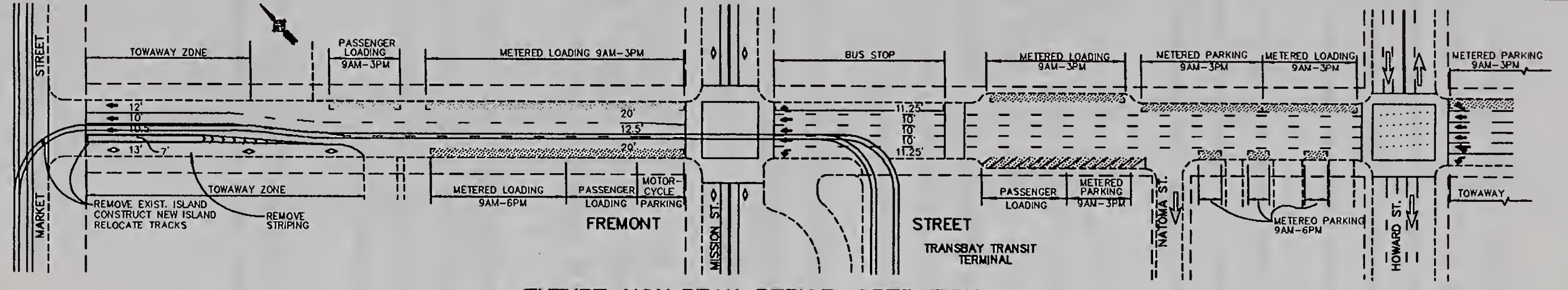
- First Street would be restriped between Market Street and Howard Street to provide an additional mixed-flow through lane and a right-curb transit lane during AM and PM peak hours. The existing left-side transit lane would remain as an all-day transit lane, but with alternate positions between peak and off-peak hours. During peak hours, the left-side



EXISTING OPERATION



FUTURE PEAK PERIOD OPERATION



FUTURE NON-PEAK PERIOD OPERATION

Source: Korve Engineering

92.202E & 94060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

2015 Changes to Fremont Street Proposed in All Build Alternatives

Figure 2-2C

transit lane would be against the east curb as a tow-away lane; during off-peak hours it would be in the first travel lane allowing metered loading or parking along the east curb. There would be overhead electronic signs to indicate the position of the left-side transit lane during different time periods of the day. The right-side transit lane would be in the tow-away lane against the west curb during peak hours only (see Figure 2-2D).

- First Street would be restriped between Howard and Harrison Streets to provide a new peak-hour only left-side transit lane against the east curb. Left turns from First Street onto Harrison Street would be allowed in this transit lane during peak hours. (See Figure 2-2D.)

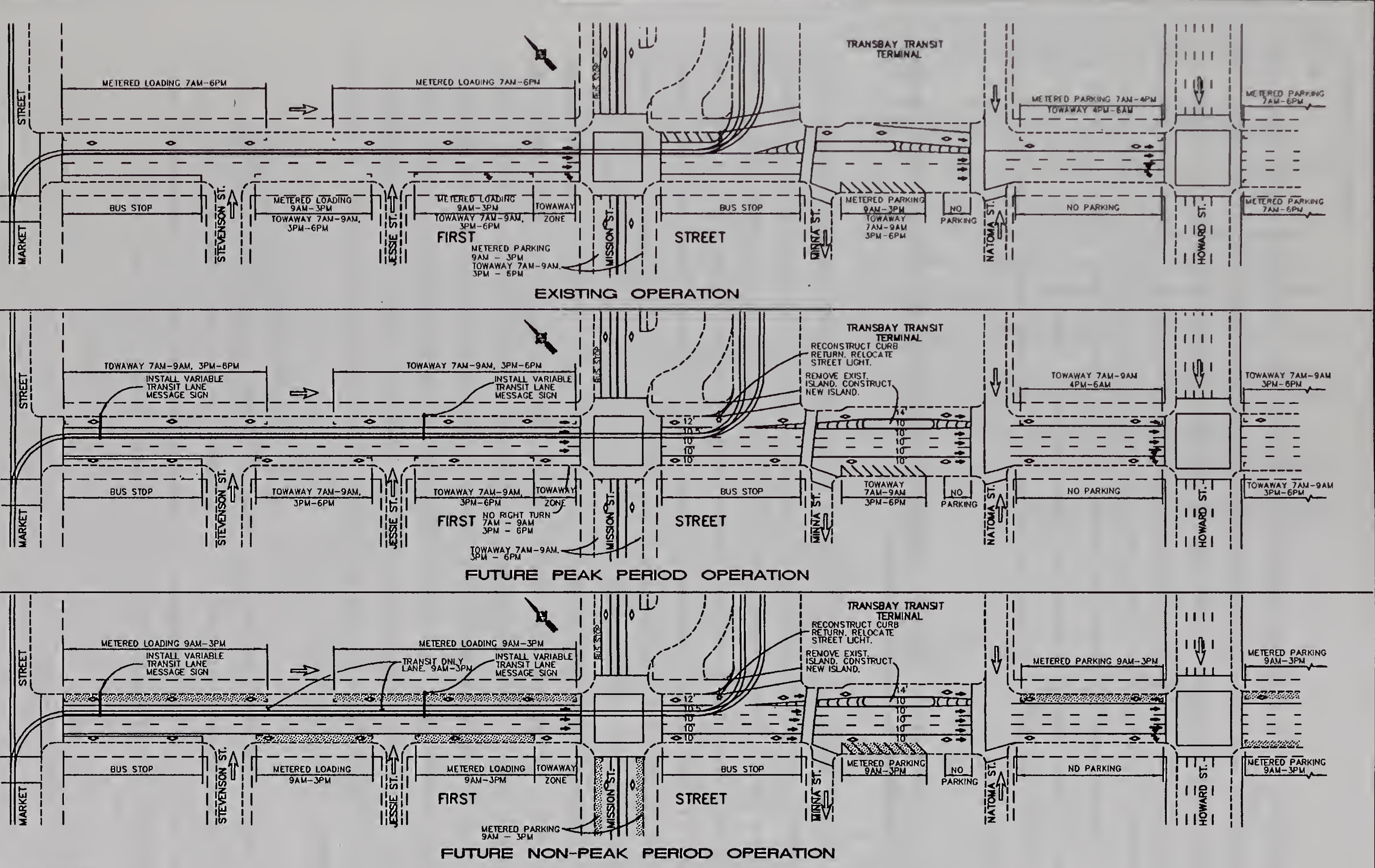
- The northbound approach of Third Street at Market Street would be restriped to provide five continuous lanes across the intersection (one shared left-through lane, three through lanes, and one shared through-right lane). The northbound section of Kearny Street between Market Street and Geary Street would be restriped to five lanes (two left-turn-only lanes and three through lanes). Third Street currently provides four continuous lanes across Market Street to Geary Street.

- The southbound approach of Fourth Street at Harrison Street would be restriped to provide an additional exclusive lane onto the I-80 freeway (two through lanes, two diagonal lanes for exclusive freeway access, and a right-turn-only lane).

- MUNI staff and the San Francisco Public Transportation Commission would consider extending the route of MUNI's 83-Pacific bus from its current eastern terminus at Battery Street to The Embarcadero, in order to allow transfers to the planned MUNI F-Line.

- A two-phase traffic signal system upgrade would optimize signal timing along Broadway, Stockton Street, and Grant Avenue. Consideration would be given to integrating four existing traffic signal systems: North of Market, Grant Avenue, Stockton Street, and Columbus/Broadway.

Some of the improvements listed above would be implemented immediately, and some would be phased-in over time when warranted by congestion levels.


MARKET
STREET
STEVENSON ST.
JESSIE ST.
MISSION ST.
MINNA ST.
NATOMA ST.
HOWARD ST.
FIRST
STREET
TRANSBAY TRANSIT TERMINAL
BUS STOP
METERED LOADING 7AM-6PM
METERED LOADING 9AM-3PM TOWAWAY 7AM-9AM, 3PM-6PM
TOWAWAY ZONE
METERED PARKING 9AM - 3PM TOWAWAY 7AM-9AM, 3PM - 6PM
METERED PARKING 9AM-3PM TOWAWAY 7AM-9AM 3PM-6PM
NO PARKING
METERED PARKING 7AM-4PM TOWAWAY 4PM-6AM
METERED PARKING 7AM-6PM
EXISTING OPERATION
TOWAWAY 7AM-9AM, 3PM-6PM
INSTALL VARIABLE TRANSIT LANE MESSAGE SIGN
RECONSTRUCT CURB RETURN. RELOCATE STREET LIGHT.
REMOVE EXIST. ISLAND. CONSTRUCT NEW ISLAND.
12'
10'
14'
NO RIGHT TURN 7AM - 9AM 3PM - 6PM
TOWAWAY 7AM-9AM 4PM-6AM
TOWAWAY 7AM-9AM 3PM-6PM
FUTURE PEAK PERIOD OPERATION
METERED LOADING 9AM-3PM
TRANSIT ONLY LANE 9AM-3PM
METERED PARKING 9AM-3PM
FUTURE NON-PEAK PERIOD OPERATION

Source: Korve Engineering

92.202E & 94060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

2015 Changes to First Street Proposed in All Build Alternatives

Figure 2-2D

Alternative Two would meet the project's purpose and need, and would involve temporary construction activities including: removal of existing pavement; utilities relocation; grading and excavation; and construction of new roadway and utilities, signals and lighting, landscaping, and street furniture. Construction would take place in four stages for an estimated total duration of 20 months. Construction activities during each stage would occur within the existing right-of-way. Construction of Alternative Two would cost approximately $62 million (escalated to midpoint of construction). Federal and State Emergency Relief (ER) funds would not be available. (See Appendix A for more information on the proposed funding of alternatives under consideration.)

2.2.3 ALTERNATIVE THREE: MID-EMBARCADERO ROADWAY AND NEW PENINSULA ACCESS RAMPS

Under this alternative, the configuration of the Embarcadero roadway between Howard Street and Broadway would be the same as with Alternative Two and would provide three continuous traffic lanes in each direction during peak periods, with the curb lane providing parking in off-peak periods. Alternative Three would provide additional on-ramp capacity to I-80 westbound and U.S. 101 southbound by constructing a new on-ramp at Harrison Street, near Essex Street; and would modify the existing Fremont Street off-ramp from I-80 westbound to allow traffic direct access to Folsom Street. This alternative would also provide additional off-ramp capacity from I-80 eastbound, and would either construct a new off-ramp to Second Street (the Second Street Option), or would widen the freeway's approach to the existing Fourth Street off-ramp (the Fourth Street Option). Under both options, Alternative Three would also convert the current PM peak-period HOV operation on the Bryant Street approaches to the Sterling Street on-ramp to mixed-flow operation, and would shift the PM peak-period HOV operation onto the Essex Street approach to the Bay Bridge (I-80 eastbound). Alternative Three would also implement a package of surface street traffic improvements to facilitate traffic flow and access to and from the freeway. (See Figures 2-3 and 2-4.)

The existing Embarcadero northbound roadway and the promenade between Folsom and Howard Streets would be realigned in this alternative the same as in Alternative Two, except that there would be three through lanes and a left-turn lane. The curb lane would be 4.5 meters (15 feet) wide, allowing parking during off-peak periods and a Class Three bicyle route.

Improvements Included in this Alternative - Second Street Option

① Reconstructed surface roadway between Howard Street and Broadway, 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction, parking lanes convertible to a third travel lane during peak periods, promenade on the bayside; sidewalk on the landside, northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets, 2 travel lanes, plus a parking lane and a Class 3 bicycle route, parking lane convertible to a third travel lane during peak periods, bayside promenade.

③ New on-ramp from Harrison Street to I-80 westbound and U S 101 southbound, modified main line striping at Fourth Street from lane-add to simple merge.

④ New off-ramp from I-80 eastbound to Second Street

⑤ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound)

⑥ Davis Street open to vehicular traffic between Clay and Washington Streets.

⑦ Conversion of Sterling Street on-ramp from PM peak period HOV operations to mixed-flow operation.

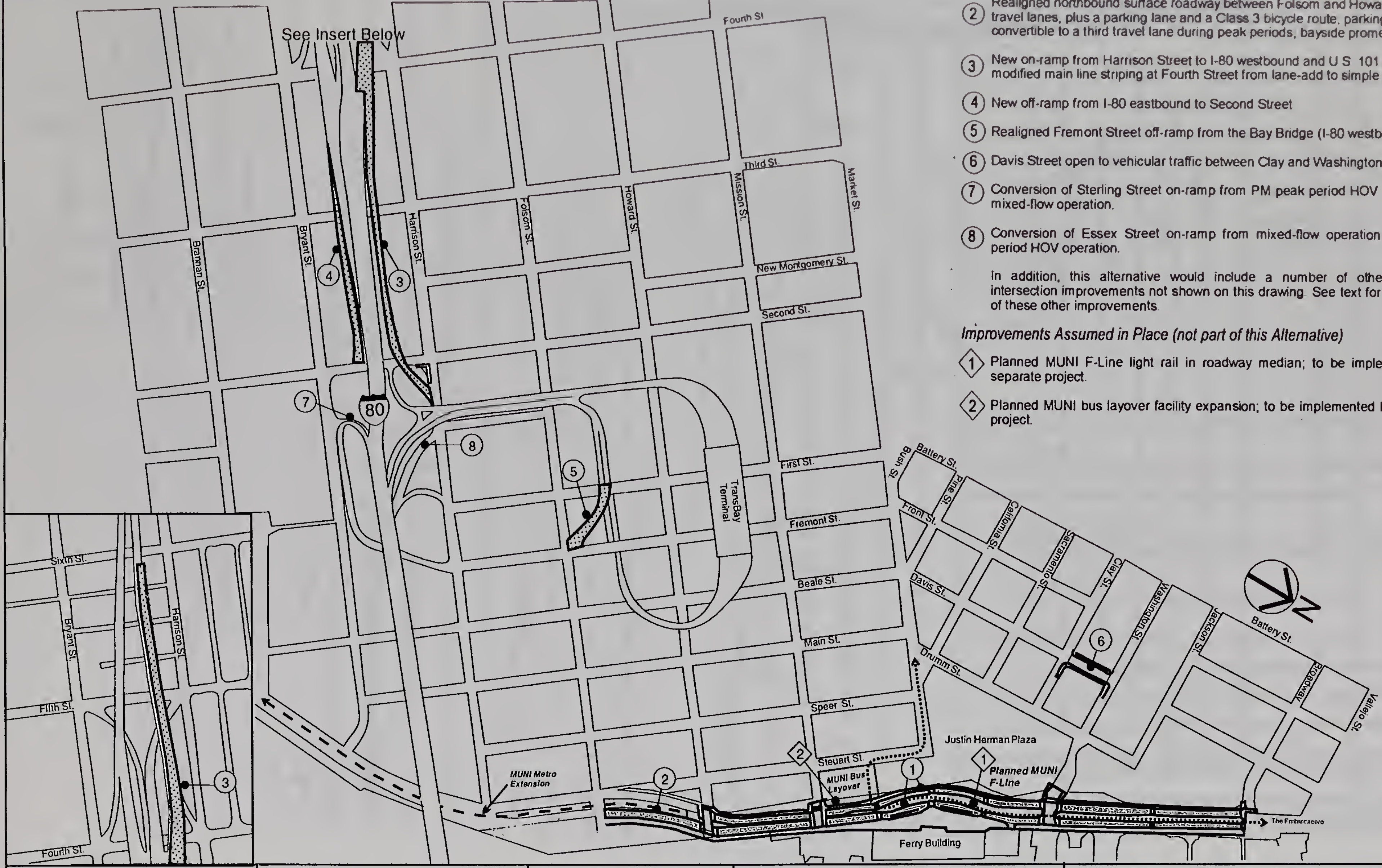
⑧ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE THREE
Mid-Embarcadero Roadway & New Peninsula Access Ramps Second Street Option

Figure 2-3

Improvements Included in this Alternative - Fourth Street Option

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, plus a parking lane and a Class 3 bicycle route; parking lane convertible to a third travel lane during peak periods; bayside promenade.

③ New on-ramp from Harrison Street to I-80 westbound and U.S. 101 southbound; modified main line striping at Fourth Street. from lane-add to simple merge.

④ Widening of existing I-80 eastbound Fourth Street off-ramp and approach.

⑤ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

⑥ Davis Street open to vehicular traffic between Clay and Washington Streets.

⑦ Conversion of Sterling Street on-ramp from PM peak period HOV operations to mixed-flow operation.

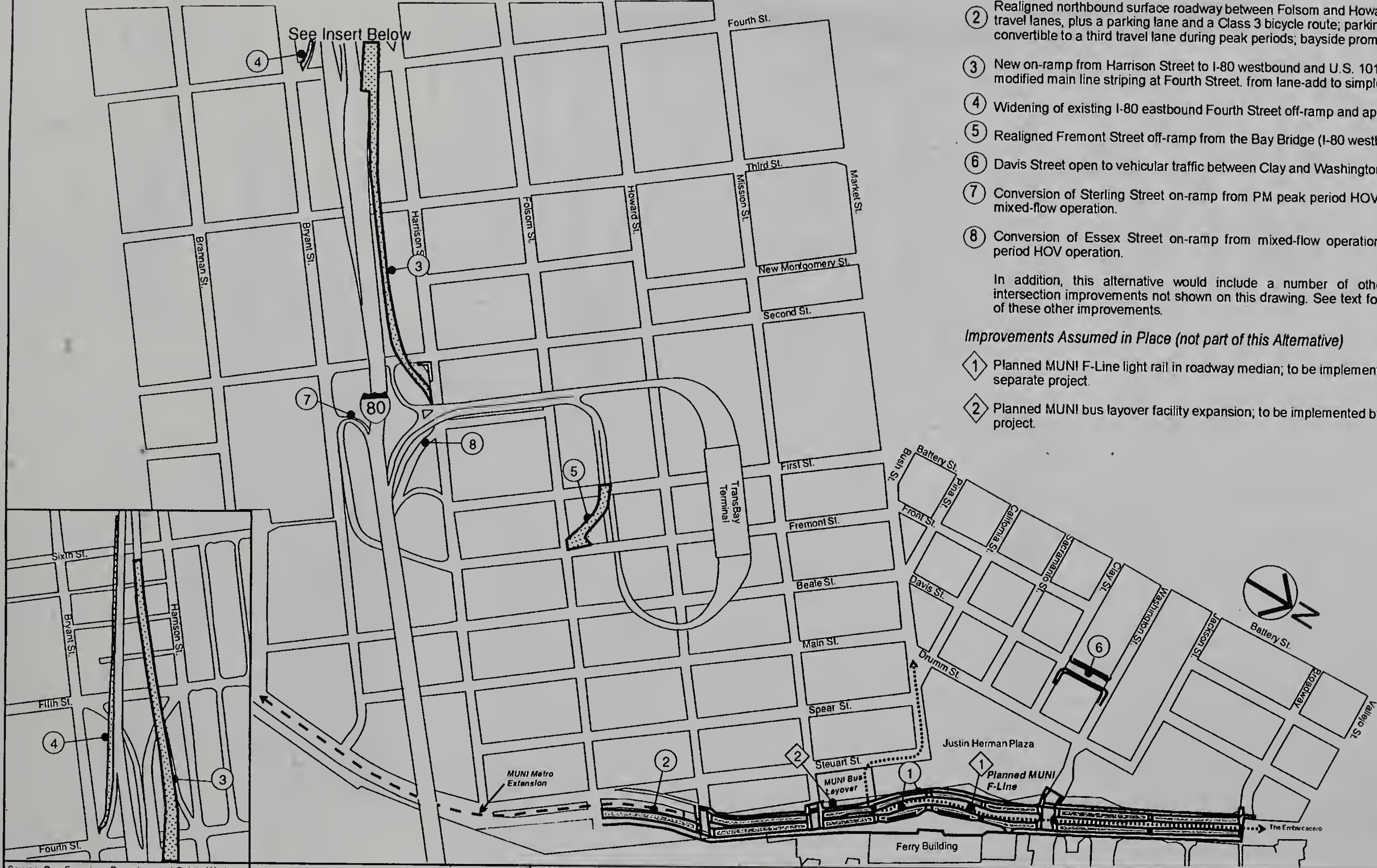
⑧ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

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Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE THREE
Mid-Embarcadero Roadway & New Peninsula Access Ramps Fourth Street Option

Figure 2-4

Steuart Street would be closed to through traffic between Folsom and Howard Streets, as in Alternative Two. The southbound roadway between Folsom and Howard Streets would be completed as part of the MUNI Metro Turnback project in late 1996.

Between Howard Street and Broadway, the northbound lanes of the Embarcadero roadway would generally follow the alignment of the existing roadway, except in front of the Ferry Building the roadway would curve slightly towards west to create a wider promenade. The southbound lanes would run parallel to the northbound lanes. Existing median parking would be removed. Between the southern end of the Ferry Building and Broadway, a 17.4-meter (57-foot) median would accommodate the planned MUNI F-Line historic trolley line and landscape amenities. The median would be narrower south of Mission Street due to site constraints.

As in Alternative Two, additional lanes would be provided on The Embarcadero at intersections for turning movements. At Broadway, there would be two through lanes and two left-turn lanes in the northbound direction. At Washington Street, there would be three through lanes and a left-turn lane in the northbound direction and three through lanes and a U-turn lane in the southbound direction. At Mission Street, there would be three through lanes and a U-turn lane in the southbound direction. The southbound U-turn lanes would allow access to the northbound lanes for vehicular access to the Ferry Building and piers. There would be two bus bays off the northbound roadway, in front of the Ferry Building.

As in Alternative Two, the pedestrian promenade would be 7.6 meters (25 feet) wide between Folsom and Mission Streets and 7.6 to 15.2 meters (25 to 50 feet) wide in front of the Agriculture Building. The current parking lots north and south of the Ferry Building entrance would be removed to provide a promenade width of 18.3 to 33.5 meters (60 to 110 feet) through the Ferry Building area. North of the Ferry Building, the promenade would be 7.6 to 10.7 meters (25 to 35 feet) wide. The sidewalk would be 4.5 meters (15 feet) wide from Mission Street to just south of Broadway, where it would be narrowed to 1.8 meters (6 feet). Between Mission and Howard Streets the roadway alignment would allow an expanded sidewalk width of 4.5 to 18.3 meters (15 to 60 feet). A portion of the extra sidewalk area would be converted to off-street parking where feasible.

As in Alternative Two, and as under existing conditions, all intersections of the reconstructed Embarcadero roadway would be at-grade and signalized, including: Folsom, Howard, Mission, and Washington Streets and Broadway. Market Street would remain closed to vehicular traffic at The Embarcadero as in the No Build Alternative. Signalized, mid-block pedestrian crossings would also be provided on the Embarcadero between Mission and Market Streets, between Market and Washington Streets, and between Washington Street and Broadway.

To facilitate traffic access to the Embarcadero roadway from the Bay Bridge (I-80 westbound), the existing Fremont Street off-ramp would be modified under this alternative so that all or a portion of the ramp would touch down at the intersection of Fremont and Folsom Streets. There would be four lanes on the off-ramp approach; two lanes would direct traffic towards the waterfront via Folsom Street, and the other two lanes would direct traffic towards downtown via Fremont Street. It has not been determined whether the City or Caltrans would design and construct proposed ramp structures, and it is possible that the existing off-ramp, with its 11% grade could continue to serve traffic turning left onto Fremont Street, and that a new ramp segment with an 8% grade would be built for traffic accessing Folsom Street. Alternatively, the entire ramp would be realigned to touch down at the corner of Folsom and Fremont Streets, allowing removal of the existing mid-block ramp touchdown. Operationally, both touchdown options would function the same, and the decision regarding design would be made based on other factors (e.g., cost and engineering).

For access from the Embarcadero roadway to the Bay Bridge (I-80 eastbound), the current PM peak-period HOV operation on the Bryant Street approaches to the Sterling Street on-ramp would be changed to mixed-flow operation, and the current mixed-flow operation on the Essex Street approach to the Bay Bridge would be changed to HOV operation during the PM peak-period. Essex Street, currently two-way with two lanes in each direction, would be made a one-way street with four lanes. Two lanes would be PM peak-period HOV lanes leading to the Bay Bridge, while the other two would be mixed-flow lanes leading to the new Harrison Street on-ramp proposed under this alternative.

For additional on-ramp capacity to the Peninsula, a new on-ramp would be built under this alternative from west of the Harrison Street and Essex Street intersection to connect to I-80 westbound/U.S. 101 southbound at Fourth Street. The new ramp would follow the path of the former TSS ramp and would ascend at an 8% grade for the first 120 meters (400 feet) to clear Second Street, and then would descend at a 4% grade to join I-80 westbound at Fourth Street. The south side of the I-80 westbound mainline deck would be widened slightly (2.4 meters (8 feet) maximum) between approximately Fourth and Sixth Streets, and the existing Fourth Street on-ramp to I-80 westbound/U.S. 101 southbound would be converted from an auxiliary lane-add to a simple merge. Harrison Street would be made a one-way westbound street between First and Third Streets. There would be two left-turn lanes on the westbound Harrison Street approach to the I-80 westbound/U.S. 101 southbound ramp.

To provide additional off-ramp capacity for I-80 eastbound traffic from the Peninsula, Alternative Three would either construct a new off-ramp to Second Street (the Second Street Option), or would widen the freeway's approach to the existing Fourth Street off-ramp (the Fourth Street Option). Under the Second Street Option, the proposed off-ramp from I-80 eastbound would touch down at a signalized intersection on Second Street between Harrison Street and Bryant Street (see Figure 2-3). The existing sidewalk and curb parking along the north side of Stillman Street, between Second and Third Streets, would be removed to accommodate the new off-ramp. The off-ramp approach would include two left-turn lanes and a right-turn lane. Traffic heading towards downtown and the waterfront would be directed to go northbound on Second Street and then eastbound on Folsom Street, and left turns from Second Street onto Bryant Street eastbound would be prohibited. The Fourth Street Option would not construct a new off-ramp, but would widen I-80 eastbound between Sixth Street and the Fourth Street off-ramp to provide additional capacity on the existing off-ramp (see Figure 2-4). Under either option, the expanded mainline approach to the off-ramp would require a sliver widening (up to 3.6 meters (12 feet)) of the I-80 eastbound structure, which could be incorporated into the currently planned retrofit work for the I-80 freeway. Alternatively, the widening could be accomplished by adding a new structure to the existing structure, if it is determined to be more feasible during final design of the project.

Alternative Three would also include reopening of Davis Street between Clay and Washington Streets to vehicular traffic.

In addition to the characteristics described above, Alternative Three and all other build alternatives would implement a package of surface street improvements, including the following:

Street and Operational Improvements Common to All Build Alternatives

- Washington Street would be restriped between Drumm Street and The Embarcadero to provide two travel lanes in each direction (as opposed to one wide lane in each direction currently). Washington Street would intersect The Embarcadero directly across from Pier One.

- A new left-turn pocket would be provided on northbound Drumm Street at Washington Street.
- Drumm Street would be restriped north of Washington Street for two northbound lanes (as opposed to one wide lane currently).
- The eastbound approach of Bryant Street would be widened between Main Street and The Embarcadero to incorporate two left-turn-only lanes and a transit lane with right turns allowed. (Bryant Street currently provides two eastbound lanes at this location.)
- The eastbound approach of Folsom Street at Second Street would be restriped to provide an exclusive left-turn lane, four through lanes, and an exclusive right-turn lane. (Folsom Street currently provides four lanes at this location.)
- Fremont Street would be restriped to include an additional mixed-flow through lane from the I-80 westbound off-ramp at Harrison Street to and across Market Street. (Fremont Street currently has four mixed-flow lanes from Howard to Mission Streets and two mixed-flow lanes and a transit-only lane from Mission to Market Streets.) The current two-way segment between Folsom and Harrison Streets would remain two-way operation. At Mission Street, there would be three through lanes, one left-turn-only lane and one right-turn-only (transit excepted) lane. At Market Street, there would be a left curb transit-only lane, a transit island, and three through lanes. The left-most through lane pavement includes the F-Line transit tracks (see Figure 2-2C).
- Front Street between Market Street and Pine Street would be restriped to four lanes: two left-turn-only and two through lanes. (Front Street currently has two wide lanes.)
- An additional mixed-flow through lane would be provided on Bush Street during the PM peak period between Montgomery Street and Battery Street by removing parking on the right side (the extra lane is already provided during the AM peak).
- First Street would be restriped between Market Street and Howard Street to provide an additional mixed-flow through lane and a right-curb transit lane during AM and PM peak hours. The existing left-side transit lane would remain as an all-day transit lane, but with alternate positions between peak and off-peak hours. During peak hours, the left-side

transit lane would be against the east curb as a tow-away lane; during off-peak hours it would be in the first travel lane allowing metered loading or parking along the east curb. There would be overhead electronic signs to indicate the position of the left-side transit lane during different time periods of the day. The right-side transit lane would be in the tow-away lane against the west curb during peak hours only (see Figure 2-2D).

- First Street would be restriped between Howard and Harrison Streets to provide a new peak-hour only left-side transit lane against the east curb. Left turns from First Street onto Harrison Street would be allowed in this transit lane during peak hours. (See Figure 2-2D.)

- The northbound approach of Third Street at Market Street would be restriped to provide five continuous lanes across the intersection (one shared left-through lane, three through lanes, and one shared through-right lane). The northbound section of Kearny Street between Market Street and Geary Street would be restriped to five lanes (two left-turn-only lanes and three through lanes). Third Street currently provides four continuous lanes across Market Street to Geary Street.

- The southbound approach of Fourth Street at Harrison Street would be restriped to provide an additional exclusive lane onto the I-80 freeway (two through lanes, two diagonal lanes for exclusive freeway access, and a right-turn-only lane).

- MUNI staff and the San Francisco Public Transportation Commission would consider extending the route of MUNI's 83-Pacific bus from its current eastern terminus at Battery Street to The Embarcadero, in order to allow transfers to the planned MUNI F-Line.

- A two-phase traffic signal system upgrade would optimize signal timing along Broadway, Stockton Street, and Grant Avenue. Consideration would be given to integrating four existing traffic signal systems: North of Market, Grant Avenue, Stockton Street, and Columbus/Broadway.

Some of the improvements listed above would be implemented immediately, and some would be phased-in over time, when warranted by congestion levels.

Alternative Three would meet the project's purpose and need, and would involve temporary construction activities including: removal of existing pavement; utilities relocation; excavation; pile driving; and construction of new roadway and utilities, signals and lighting, landscaping, street furniture, and freeway ramps. Construction under either the Second Street Option or the

Fourth Street Option would take place in four stages for an estimated total duration of 21 months. Construction activities during each stage would occur within the existing right-of-way. Construction of Alternative Three would cost approximately $102 million under the Second Street Option and $101 million under the Fourth Street Option (escalated to midpoint of construction). Federal and State Emergency Relief (ER) funds would be available. (See Appendix A for more information on the funding of alternatives under consideration.)

2.2.4 ALTERNATIVE FOUR: MID-EMBARCADERO ROADWAY WITH TRAFFIC MODIFICATIONS

The configuration of the Embarcadero roadway under this alternative would be the same as with Alternative Two and would provide three continuous traffic lanes in each direction between Howard Street and Broadway during peak periods, with the curb lane providing parking in off-peak periods. As in Alternative Two, there would be two through lanes and a left-turn lane on the realigned northbound roadway between Folsom and Howard Streets. Alternative Four would also modify the existing Fremont Street off-ramp from I-80 westbound to allow direct access to Folsom Street, and would implement surface and operational traffic improvements similar to Alternative Three. No new on- or off-ramps to I-80/U.S. 101 would be provided. (See Figure 2-5.) The existing Embarcadero northbound roadway and the promenade between Folsom and Howard Streets would be realigned in this alternative the same as in Alternative Two. There would be two through lanes and a left-turn lane at Howard Street. The curb lane would be 4.5 meters (15 feet) wide, allowing motor vehicles and a Class Three bicycle route. Steuart Street would be closed to through traffic between Folsom and Howard Streets. The southbound roadway between Folsom and Howard Streets would be completed as part of the MUNI Metro Turnback project in late 1996.

Between Howard Street and Broadway, the Embarcadero roadway would have the same alignment and lane configuration as in Alternative Two. The northbound lanes would generally follow the alignment of the existing roadway, except in front of the Ferry Building the roadway would curve slightly towards west to create a wider promenade. The southbound lanes would run parallel to the northbound lanes. Existing median parking would be removed. Between the southern end of the Ferry Building and Broadway, a 17.4-meter (57-foot) median would accommodate the planned MUNI F-Line historic trolley line and landscape amenities. The median would be narrower south of Mission Street due to site constraints.

Improvements Included in this Alternative

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, bicycle route, and bayside promenade.

③ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

④ Conversion of Sterling Street on-ramp from PM peak period HOV operation to mixed-flow operation.

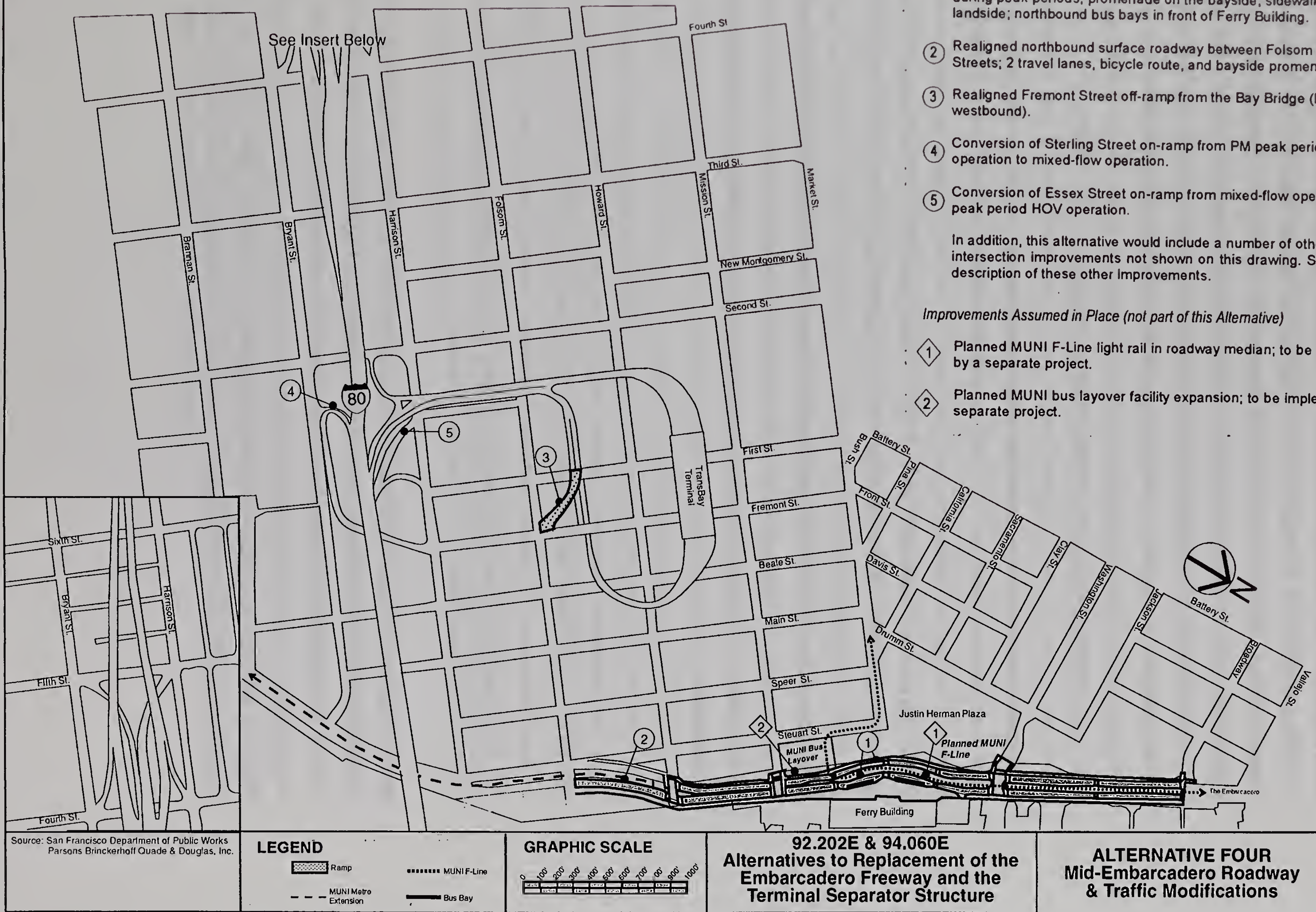
⑤ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other Improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

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Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE FOUR
Mid-Embarcadero Roadway & Traffic Modifications

Figure 2-5

As in Alternative Two, additional lanes would be provided on The Embarcadero at intersections for turning movements. At Broadway, there would be two through lanes and two left-turn lanes in the northbound direction. At Washington Street, there would be three through lanes and a left-turn lane in the northbound direction and three through lanes and a U-turn lane in the southbound direction. At Mission Street, there would be three through lanes and a U-turn lane in the southbound direction. The southbound U-turn lanes would allow access to the northbound lanes for vehicular access to the Ferry Building and piers. There would be two bus bays off the northbound roadway, in front of the Ferry Building.

As in Alternative Two, the pedestrian promenade would be 7.6 meters (25 feet) wide between Folsom and Mission Streets and 7.6 to 15.2 meters (25 to 50 feet) wide in front of the Agriculture Building. The current parking lots north and south of the Ferry Building entrance would be removed to provide a promenade width of 18.3 to 33.5 meters (60 to 110 feet) through the Ferry Building area. North of the Ferry Building, the promenade would be 7.6 to 10.7 meters (25 to 35 feet) wide. The sidewalk would be 4.5 meters (15 feet) wide from Mission Street to just south of Broadway, where it would be narrowed to 1.8 meters (6 feet). Between Mission and Howard Streets, the roadway alignment would allow an expanded sidewalk width of 4.5 to 18.3 meters (15 to 60 feet). A portion of the extra sidewalk area would be converted to off-street parking where feasible.

As in Alternative Two, all intersections of the reconstructed Embarcadero roadway would be at-grade and signalized, including: Folsom, Howard, Mission, and Washington Streets and Broadway. Market Street would remain closed to vehicular traffic at The Embarcadero as in the No Build Alternative. Signalized, mid-block pedestrian crossings would also be provided on The Embarcadero between Mission and Market Streets, between Market and Washington Streets, and between Washington Street and Broadway.

As in Alternative Three, the existing Fremont Street off-ramp from the Bay Bridge (I-80 westbound) would be modified in this alternative so that all or a portion of the ramp would touch down at the intersection of Fremont and Folsom Streets. There would be four lanes on the off-ramp approach; two lanes would direct traffic towards the waterfront via Folsom Street, and the other two lanes would direct traffic towards downtown via Fremont Street. It has not been determined whether the City or Caltrans would design and construct proposed ramp structures, and it is possible that the existing off-ramp, with its 11% grade could continue to serve traffic turning left onto Fremont Street, and that a new ramp segment with an 8% grade would be built for traffic accessing Folsom Street. Alternatively, the entire ramp would be realigned to touch down at the corner of Folsom and Fremont Streets, allowing removal of the existing mid-block ramp touchdown. Operationally, both touchdown options would function the same, and the decision regarding design would be made based on other factors (e.g., cost and engineering).

Similar to Alternative Three, this alternative would convert the current PM peak-period HOV operation on the Bryant Street approaches to the Sterling Street on-ramp to mixed-flow operation, and would shift the PM peak-period HOV operation onto Essex Street. Essex Street would remain a two-way street under this alternative.

In addition to the characteristics described above, Alternative Four and all other build alternatives would implement a package of surface street improvements including the following:

Street and Operational Improvements Common to All Build Alternatives

- Washington Street would be restriped between Drumm Street and The Embarcadero to provide two travel lanes in each direction (as opposed to one wide lane in each direction currently). Washington Street would intersect The Embarcadero directly across from Pier One.

- A new left-turn pocket would be provided on northbound Drumm Street at Washington Street.

- Drumm Street would be restriped north of Washington Street for two northbound lanes (as opposed to one wide lane currently).

- The eastbound approach of Bryant Street would be widened between Main Street and The Embarcadero to incorporate two left-turn-only lanes and a transit lane with right turns allowed. (Bryant Street currently provides two eastbound lanes at this location.)

- The eastbound approach of Folsom Street at Second Street would be restriped to provide an exclusive left-turn lane, four through lanes, and an exclusive right-turn lane. (Folsom Street currently provides four lanes at this location.)

- Fremont Street would be restriped to include an additional mixed-flow through lane from the I-80 westbound off-ramp at Harrison Street to and across Market Street. (Fremont Street currently has four mixed-flow lanes from Howard to Mission Streets and two mixed-flow lanes and a transit-only lane from Mission to Market Streets.) The current two-way segment between Folsom and Harrison Streets would remain two-way operation. At Mission Street, there would be three through lanes, one left-turn-only lane and one right-turn-only (transit excepted) lane. At Market Street, there would be a left curb transit-only lane, a transit island, and three through lanes. The left-most through lane pavement includes the F-Line transit tracks (see Figure 2-2C).

- Front Street between Market Street and Pine Street would be restriped to four lanes: two left-turn-only and two through lanes. (Front Street currently has two wide lanes.)

- An additional mixed-flow through lane would be provided on Bush Street during the PM peak period between Montgomery Street and Battery Street by removing parking on the right side (the extra lane is already provided during the AM peak).

- First Street would be restriped between Market Street and Howard Street to provide an additional mixed-flow through lane and a right-curb transit lane during AM and PM peak hours. The existing left-side transit lane would remain as an all-day transit lane, but with alternate positions between peak and off-peak hours. During peak hours, the left-side transit lane would be against the east curb as a tow-away lane; during off-peak hours it would be in the first travel lane allowing metered loading or parking along the east curb. There would be overhead electronic signs to indicate the position of the left-side transit lane during different time periods of the day. The right-side transit lane would be in the tow-away lane against the west curb during peak hours only (see Figure 2-2D).

- First Street would be restriped between Howard and Harrison Streets to provide a new peak-hour only left-side transit lane against the east curb. Left-turns from First Street onto Harrison Street would be allowed in this transit lane during peak hours. (See Figure 2-2D.)

- The northbound approach of Third Street at Market Street would be restriped to provide five continuous lanes across the intersection (one shared left-through lane, three through lanes, and one shared through-right lane). The northbound section of Kearny Street between Market Street and Geary Street would be restriped to five lanes (two left-turn-only lanes and three through lanes). Third Street currently provides four continuous lanes across Market Street to Geary Street.

- The southbound approach of Fourth Street at Harrison Street would be restriped to provide an additional exclusive lane onto the I-80 freeway (two through lanes, two diagonal lanes for exclusive freeway access, and a right-turn-only lane).
- MUNI staff and the San Francisco Public Transportation commission would consider extedning the route of MUNI's 83-Pacific bus from its current eastern terminus at Battery Street to The Embarcadero, in order to allow transfers to the planned MUNI F-Line.
- A two-phase traffic signal system upgrade would optimize signal timing along Broadway, Stockton Street, and Grant Avenue. Consideration would be given to integrating four existing traffic signal systems: North of Market, Grant Avenue, Stockton Street, and Columbus/Broadway.

Some of the improvements listed above would be implemented immediately, and some would be phased-in over time, when warranted by congestion levels.

Alternative Four would meet the project's purpose and need, and would involve temporary construction activities including: removal of existing pavement; utilities relocation; excavation; and construction of new roadway and utilities, signals and lighting, landscaping, street furniture and the Fremont Street off-ramp. Construction would take place in four stages for an estimated total duration of 20 months. Construction activities during each stage would occur within the existing right-of-way. Construction of Alternative Four would cost approximately $68 million (escalated to midpoint of construction). Federal and State Emergency Relief (ER) funds would not be available. (See Appendix A for more information on the funding of alternatives under consideration.)

2.2.5 ALTERNATIVE FIVE: CURVED MID-EMBARCADERO ROADWAY AND NEW PENINSULA ACCESS RAMPS

Alternative Five is identical to Alternative Three except that it would modify the alignment of the Embarcadero roadway in front of the Ferry Building. In this alternative, the northbound lanes of The Embarcadero would follow the existing straight alignment through the Ferry Building area, and the southbound roadway alignment would diverge from the northbound lanes to curve westward directly in front of the Ferry Building, creating a plaza area between the northbound and southbound lanes.

The Embarcadero roadway would provide three continuous traffic lanes in each direction between Howard Street and Broadway during peak periods, with the curb lane providing parking in off-peak periods. The northbound roadway between Folsom and Howard Streets would be realigned with three through lanes and a left-turn lane during peak periods, with the curb lane providing parking in off-peak periods. Alternative Five would also modify the existing Fremont Street off-ramp from I-80 westbound to allow traffic direct access to Folsom Street, and would construct a new on-ramp to I-80 westbound and U.S. 101 southbound at Harrison Street, near Essex Street. This alternative would also provide additional off-ramp capacity from I-80 eastbound, and would either construct a new off-ramp to Second Street (Second Street Option), or would widen the freeway's approach to the existing Fourth Street off-ramp (Fourth Street Option). Under both options, Alternative Five would also convert the current PM peak-period HOV operation on Bryant Street to mixed-flow operation, and would shift the PM peak-period HOV operation onto Essex Street. Alternative Five would also implement a package of surface street traffic improvements to facilitate traffic flow and freeway access. (See Figures 2-6 and 2-7.)

The existing Embarcadero northbound roadway and the promenade between Folsom and Howard Streets would be realigned the same as in Alternative Three. There would be three through lanes and a left-turn lane at Howard Street. The curb lane would be 4.5 meters (15 feet) wide, providing parking during off-peak periods and a Class Three bicycle route. Steuart Street would be closed to through traffic between Folsom and Howard Streets, as in the No Build Alternative. The southbound roadway between Folsom and Howard Streets would be completed as part of the MUNI Metro Turnback project in late 1996.

Between Howard Street and Broadway, the northbound lanes of the Embarcadero roadway would generally follow the straight alignment of the existing roadway. The southbound lanes would curve west to form a public plaza directly in front of the Ferry Building. The existing median parking would be removed between the southern end of the Ferry Building and Broadway. At its widest, an 45.7-meter (150-foot) median would accommodate a plaza, the planned MUNI F-Line historic trolley line, and landscape amenities. The median would be narrower south of Mission Street due to site constraints. (For more detail on the roadway alignment in front of the Ferry Building under this alternative and under "Mitigated Alternative

Improvements Included in this Alternative - Second Street Option

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, plus a parking lane and a Class 3 bicycle route; parking lane convertible to a third travel lane during peak periods; bayside promenade.

③ New on-ramp from Harrison Street to I-80 westbound and U.S. 101 southbound; modified main line striping at Fourth Street from lane-add to simple merge.

④ New off-ramp from I-80 eastbound to Second Street.

⑤ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

⑥ Davis Street open to vehicular traffic between Clay and Washington Streets.

⑦ Conversion of Sterling Street on-ramp from PM peak period HOV operations to mixed-flow operation.

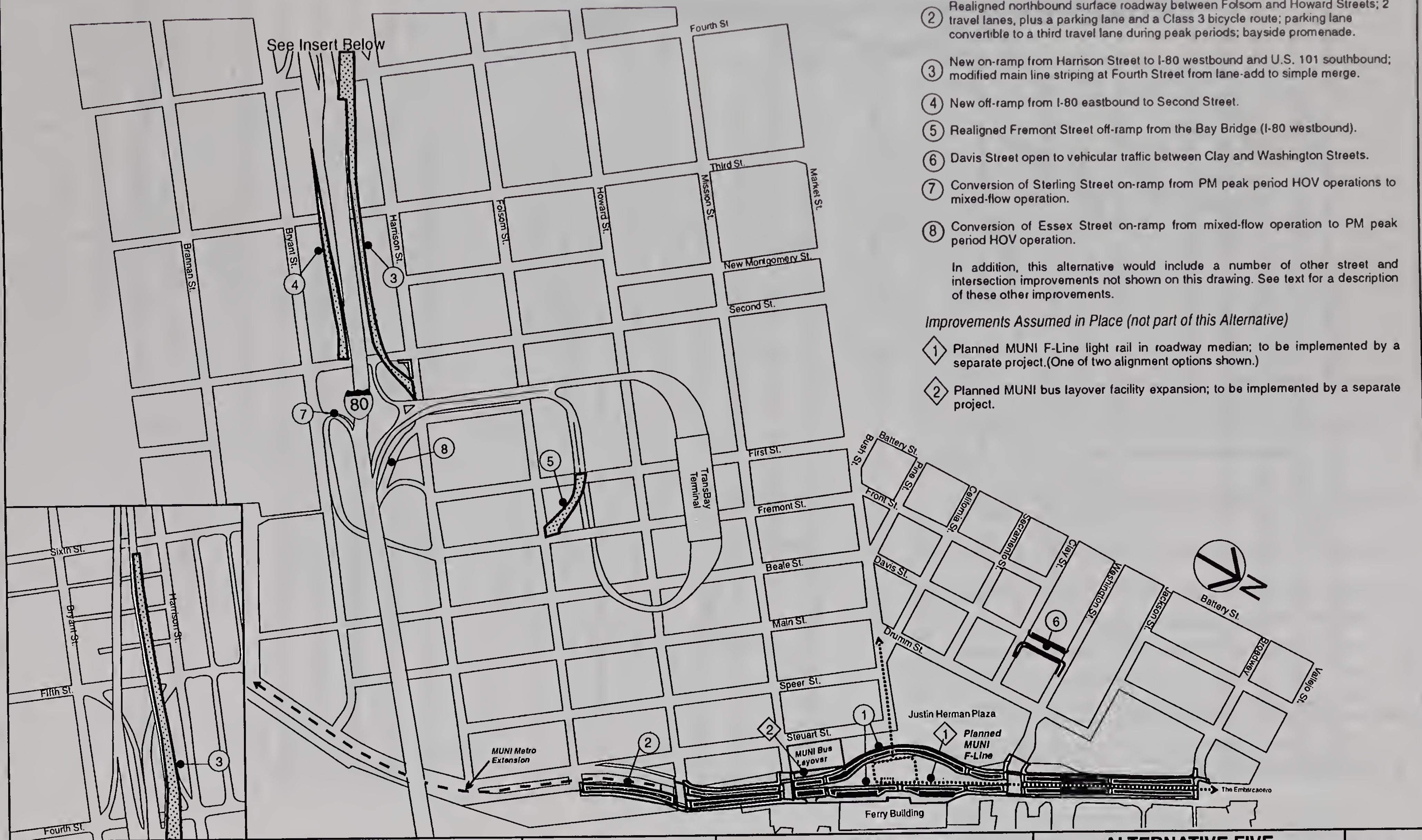
⑧ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.(One of two alignment options shown.)

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

LEGEND

▨ Ramp
- - - MUNI Metro Extension
•••••••• MUNI F-Line
▬ Bus Bay

GRAPHIC SCALE

0 100' 200' 300' 400' 500' 600' 700' 800' 900' 1000'

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Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE FIVE
Curved Mid-Embarcadero Roadway & New Peninsula Access Ramps
Second Street Option

Figure 2-6

Improvements Included in this Alternative - Fourth Street Option

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, plus a parking lane and a Class 3 bicycle route; parking lane convertible to a third travel lane during peak periods; bayside promenade.

③ New on-ramp from Harrison Street to I-80 westbound and U.S. 101 southbound; modified main line striping at Fourth Street.from lane-add to simple merge.

④ Widening of existing I-80 eastbound Fourth Street off-ramp and approach.

⑤ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

⑥ Davis Street open to vehicular traffic between Clay and Washington Streets.

⑦ Conversion of Sterling Street on-ramp from PM peak period HOV operations to mixed-flow operation.

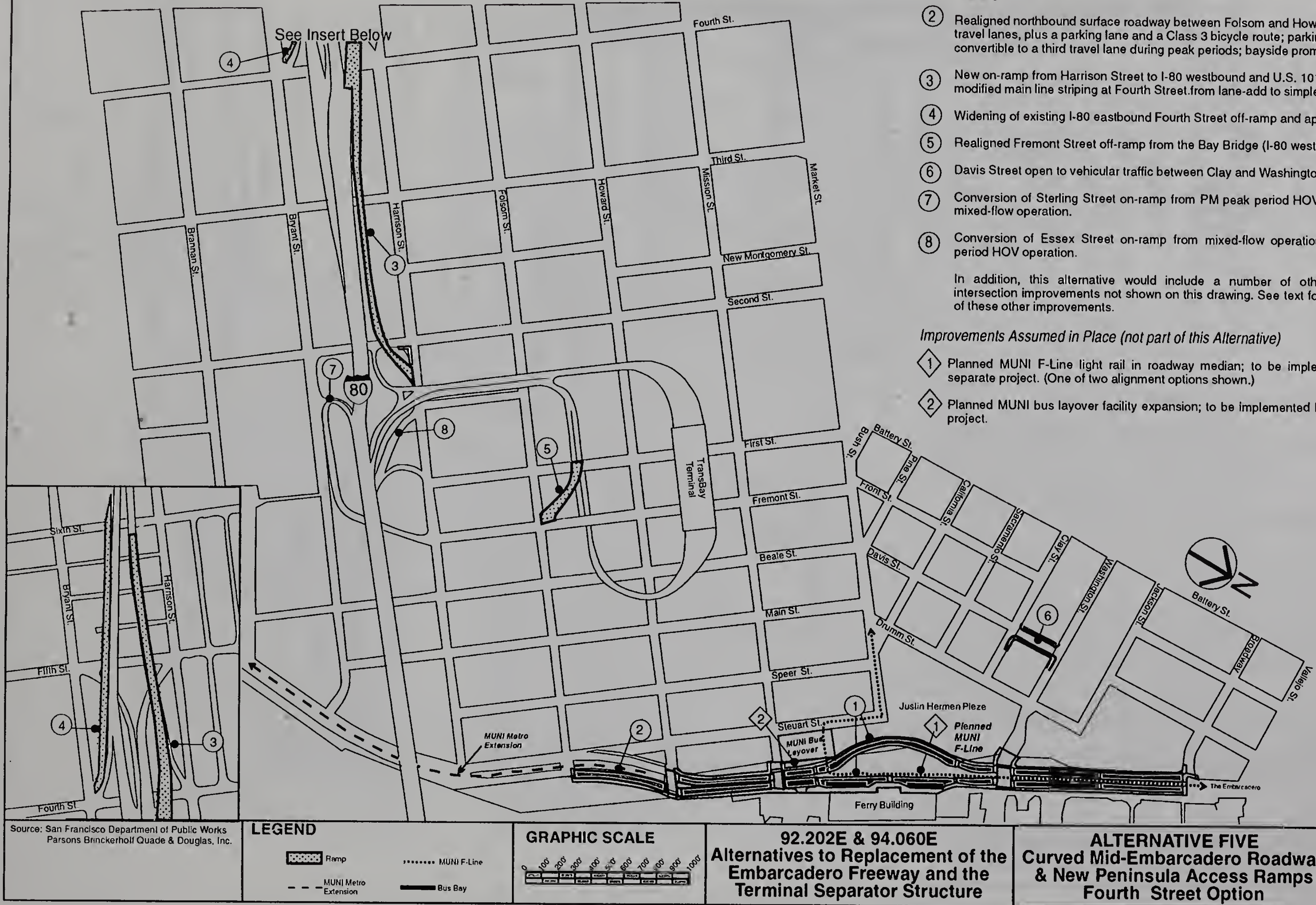
⑧ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project. (One of two alignment options shown.)

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

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Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE FIVE
Curved Mid-Embarcadero Roadway & New Peninsula Access Ramps Fourth Street Option

Figure 2-7

Five", see text and diagrams on pp. 228 and 229.) The F-Line alignment under this alternative would either be as shown in Figure 2-6, or as in Figure 2-7, and would loop inside the plaza area or would have a straight alignment through the plaza. While the F-Line is assumed to be in place under all alternatives, and its configuration would be determined to some extent by the roadway alignment, it would be a separate project.

Between Howard Street and Broadway, additional lanes would be provided on The Embarcadero at intersections for turning movements. At Broadway, there would be two through lanes and two left-turn lanes in the northbound direction. At Washington Street, there would be three through lanes and a left-turn lane in the northbound direction and three through lanes and a U-turn lane in the southbound direction. At Mission Street, there would be three through lanes and a U-turn lane in the southbound direction. The southbound U-turn lanes would allow access to the northbound lanes for vehicular access to the Ferry Building and piers. There would be two bus bays off the northbound roadway, in front of the Ferry Building.

Under this alternative, the pedestrian promenade would be 7.6 meters (25 feet) wide between Folsom and Mission Streets and 7.6 to 15.2 meters (25 to 50 feet) wide in front of the Agriculture Building. The current parking lots north and south of the Ferry Building entrance would be removed to provide a promenade width of 15.2 to 18.3 meters (50 to 60 feet) through the Ferry Building area. North of the Ferry Building, the promenade would be 7.6 to 10.7 meters (25 to 35 feet) wide. The sidewalk would be 4.5 meters (15 feet) wide from Mission Street to just south of Broadway, where it would be narrowed to 1.8 meters (6 feet). Between Mission and Howard Streets, the roadway alignment would allow an expanded sidewalk width of 4.5 to 18.3 meters (15 to 60 feet). A portion of the extra sidewalk area would be converted to off-street parking where feasible.

Under this alternative, all intersections of the reconstructed Embarcadero roadway would be at-grade and signalized, including: Folsom, Howard, Mission, and Washington Streets and Broadway. Market Street would remain closed to vehicular traffic at The Embarcadero, as in the No Build Alternative. Signalized, mid-block pedestrian crossings would also be provided on The Embarcadero between Mission and Market Streets, between Market and Washington Streets, and between Washington Street and Broadway.

As in Alternative Three, the existing Fremont Street off-ramp from the Bay Bridge (I-80 westbound) would be modified in this alternative so that all or a portion of the ramp would touch down at the intersection of Fremont and Folsom Streets. There would be four lanes on the off-ramp approach; two lanes would direct traffic towards the waterfront via Folsom Street, and the other two lanes would direct traffic towards downtown via Fremont Street. It has not beenand it is possible that the existing off-ramp, with its 11% grade could continue to serve traffic turning left onto Fremont Street, and that a new ramp segment with an 8% grade would be built for traffic accessing Folsom Street. Alternatively, the entire ramp would be realigned to touch down at the corner of Folsom and Fremont Streets, allowing removal of the existing mid-block ramp touchdown. Operationally, both touchdown options would function the same, and the decision regarding design would be made based on other factors (e.g., cost and engineering).

As in Alternative Three, Alternative Five would also change the current PM peak-period HOV operation on Bryant Street to mixed-flow operation, and would shift the PM peak-period HOV operation onto the Essex Street approach to the Bay Bridge (I-80 eastbound). As with Alternative Three, Essex Street would be made a one-way street with four lanes. Two lanes would be PM peak-period HOV lanes leading to the Bay Bridge, while the other two would be mixed-flow lanes leading to the new Harrison Street on-ramp proposed under this alternative.

As in Alternative Three, this alternative would construct a new on-ramp from west of the Harrison Street and Essex Street intersection to connect to I-80 westbound/U.S. 101 southbound at Fourth Street. The new ramp would follow the path of the former TSS ramp and would ascend at an 8% grade for the first 120 meters (400 feet) to clear Second Street, and then would descend at a 4% grade to join I-80 westbound at Fourth Street. The south side of the I-80 westbound mainline deck would be slightly widened (2.4 meters (8 feet) maximum) between approximately Fourth and Sixth Streets, and the existing Fourth Street on-ramp to I-80 westbound/U.S. 101 southbound would be converted from an auxiliary lane-add to a simple merge. Harrison Street would be made a one-way westbound street between First and Third Streets. There would be two left-turn lanes on the westbound Harrison Street approach to the I-80 westbound/U.S. 101 southbound ramp.

As in Alternative Three, additional off-ramp capacity for I-80 eastbound traffic would be provided under this alternative by either constructing a new off-ramp to Second Street, or by widening the freeway's approach to the existing Fourth Street off-ramp. Under the Second Street Option, the proposed off-ramp would touch down at a signalized intersection on Second Street between Harrison and Bryant Streets (Figure 2-6). The existing sidewalk and curb parking along the north side of Stillman Street, between Second and Third Streets, would be removed to accommodate the new off-ramp. The off-ramp approach would include two left-turn lanes and a right-turn lane. Traffic heading towards downtown and the waterfront would be directed to go northbound on Second Street and then eastbound on Folsom Street, and left turns from Second Street onto Bryant Street eastbound would be prohibited. Under the Fourth Street Option, the I-80 eastbound mainline deck would be widened between Sixth Street and the existing Fourth Street off-ramp to provide additional capacity on the existing off-ramp (see Figure 2-7). Under either option, the expanded mainline approach to the off-ramp would require a sliver widening (up to 3.6 meters (12 feet)) of the I-80 eastbound structure, which could be incorporated into the currently planned retrofit work for the I-80 freeway. Alternatively, the widening could be accomplished by adding a new structure to the existing structure, if it is determined to be more feasible during final design of the project.

As in Alternative Three, Alternative Five would also include reopening of Davis Street between Clay and Washington Streets to vehicular traffic.

In addition to the characteristics described above, Alternative Five and all other build alternatives would implement a package of surface street improvements including the following:

Street and Operational Improvements Common to All Build Alternatives

- Washington Street would be restriped between Drumm Street and The Embarcadero to provide two travel lanes in each direction (as opposed to one wide lane in each direction currently). Washington Street would intersect The Embarcadero directly across from Pier One.

- A new left-turn pocket would be provided on northbound Drumm Street at Washington Street.

- Drumm Street would be restriped north of Washington Street for two northbound lanes (as opposed to one wide lane currently).

- The eastbound approach of Bryant Street would be widened between Main Street and The Embarcadero to incorporate two left-turn-only lanes and a transit lane with right turns allowed. (Bryant Street currently provides two eastbound lanes at this location.)

- The eastbound approach of Folsom Street at Second Street would be restriped to provide an exclusive left-turn lane, four through lanes, and an exclusive right-turn lane. (Folsom Street currently provides four lanes at this location.)

- Fremont Street would be restriped to include an additional mixed-flow through lane from the I-80 westbound off-ramp at Harrison Street to and across Market Street. (Fremont Street currently has four mixed-flow lanes from Howard to Mission Streets and two mixed-flow lanes and a transit-only lane from Mission to Market Streets.) The current two-way segment between Folsom and Harrison Streets would remain two-way operation. At Mission Street, there would be three through lanes, one left-turn-only lane and one right-turn-only (transit excepted) lane. At Market Street, there would be a left curb transit-only lane, a transit island, and three through lanes. The left-most through lane pavement includes the F-Line transit tracks (see Figure 2-2C).

- Front Street between Market Street and Pine Street would be restriped to four lanes: two left-turn-only and two through lanes. (Front Street currently has two wide lanes.)

- An additional mixed-flow through lane would be provided on Bush Street during the PM peak period between Montgomery Street and Battery Street by removing parking on the right side (the extra lane is already provided during the AM peak).

- First Street would be restriped between Market Street and Howard Street to provide an additional mixed-flow through lane and a right-curb transit lane during AM and PM peak hours. The existing left-side transit lane would remain as an all-day transit lane, but with alternate positions between peak and off-peak hours. During peak hours, the left-side transit lane would be against the east curb as a tow-away lane; during off-peak hours it would be in the first travel lane allowing metered loading or parking along the east curb. There would be overhead electronic signs to indicate the position of the left-side transit lane during different time periods of the day. The right-side transit lane would be in the tow-away lane against the west curb during peak hours only (see Figure 2-2D).

- First Street would be restriped between Howard and Harrison Streets to provide a new peak-hour only left-side transit lane against the east curb. Left-turns from First Street onto Harrison Street would be allowed in this transit lane during peak hours. (See Figure 2-2D.)

- The northbound approach of Third Street at Market Street would be restriped to provide five continuous lanes across the intersection (one shared left-through lane, three through lanes, and one shared through-right lane). The northbound section of Kearny Street between Market Street and Geary Street would be restriped to five lanes (two left-turn-only lanes and three through lanes). Third Street currently provides four continuous lanes across Market Street to Geary Street.

- The southbound approach of Fourth Street at Harrison Street would be restriped to provide an additional exclusive lane onto the I-80 freeway (two through lanes, two diagonal lanes for exclusive freeway access, and a right-turn-only lane).
- MUNI staff and the San Francisco Public Transportation Commission would consider extending the route of MUNI's 83-Pacific bus from its current eastern terminus at Battery Street to The Embarcadero, in order to allow transfers to the planned MUNI F-Line.
- A two-phase traffic signal system upgrade would optimize signal timing along Broadway, Stockton Street, and Grant Avenue. Consideration would be given to integrating four existing traffic signal systems: North of Market, Grant Avenue, Stockton Street, and Columbus/Broadway.

Some of the improvements listed above would be implemented immediately, and some would be phased-in over time when warranted by congestion levels.

Alternative Five would meet the project's purpose and need, and would involve temporary construction activities including: removal of existing pavement; utilities relocation; excavation; pile driving; and construction of new roadway and utilities, signals and lighting, landscaping, street furniture, and freeway ramps. Construction under either the Second Street Option or the Fourth Street Option would take place in four stages for an estimated total duration of 21 months. Construction activities during each stage would occur within the existing right-of-way. Construction of Alternative Five would cost approximately $103 million under the Second Street Option and $102 million under the Fourth Street Option (escalated to midpoint of construction). Federal and State Emergency Relief (ER) funds would be available. (See Appendix A for more information on the funding of alternatives under consideration.)

2.2.6 DPT VARIANT

The San Francisco Department of Parking and Traffic (DPT) has proposed a compromise version of Alternative Four and the Fourth Street Option of Alternatives Three and Five. This variant would be identical to the Fourth Street Option of Alternatives Three and Five, except that it would omit the new on-ramp to I-80 Westbound proposed in these alternatives, and would not immediately implement operational changes to the existing Sterling Street and Essex Street on-ramps to I-80 Eastbound. Like the Fourth Street Option of Alternatives Three and Five, the existing Fremont Street off-ramp would be modified to provide direct access to Folsom Street; the Embarcadero Roadway would be improved as a six lane roadway between Folsom Street and Broadway (four lanes plus curb-side parking lanes in off-peak periods); Davis Street would be reopened between Clay and Washington Streets; and a package of other surface street and operational improvements would be implemented throughout downtown. When warranted by congestion levels in the future (sometime before the analysis year of 2015), the existing Sterling Street on-ramp (to I-80 eastbound) would be converted to mixed-flow operation, and the existing Essex Street on-ramp (also to I-80 eastbound) would be restricted to carpools only in the PM peak period.

While it is unclear whether Caltrans and FHWA would consider this variant eligible for " ER" funds, the resulting demand-to-capacity ratio at freeway on-ramps in the PM peak hour would be 0.91, which is virtually identical to Alternatives Three and Five (which have been determined eligible for " ER" funds). Traffic impacts of the DPT Variant are discussed on pages 293-294. Other, non-traffic related potential impacts of the DPT Variant would be similar to Alternative Four, and identical to the Fourth Street Option of Alternatives Three and Five, minus effects of the proposed freeway on-ramp near Harrison and Second Streets. The cost of the DPT Variant would fall between costs associated with Alternatives Three and Four.

2.3 RELATED PROJECTS, REASONABLY FORESEEABLE FUTURE PROJECTS, AND OTHER POSSIBLE FUTURE PROJECTS

The project analyzed in this EIS/EIR is one of many potential transportation and development projects that may occur in the project vicinity and in the region by the future analysis year of 2015. Potential future projects may be divided into three categories: (1) " related projects" which are planned and funded transportation improvements in the project vicinity (some are already under construction); (2) " reasonably foreseeable future projects," which are not necessarily approved or funded, but which City staff and/or staff of the Metropolitan Transportation Commission have determined are reasonable to assume will be completed by 2010 or 2015; and (3) " other possible future projects" that may have been discussed in the press, but have not been approved or funded, and are too speculative to assume for the purposes of this analysis.

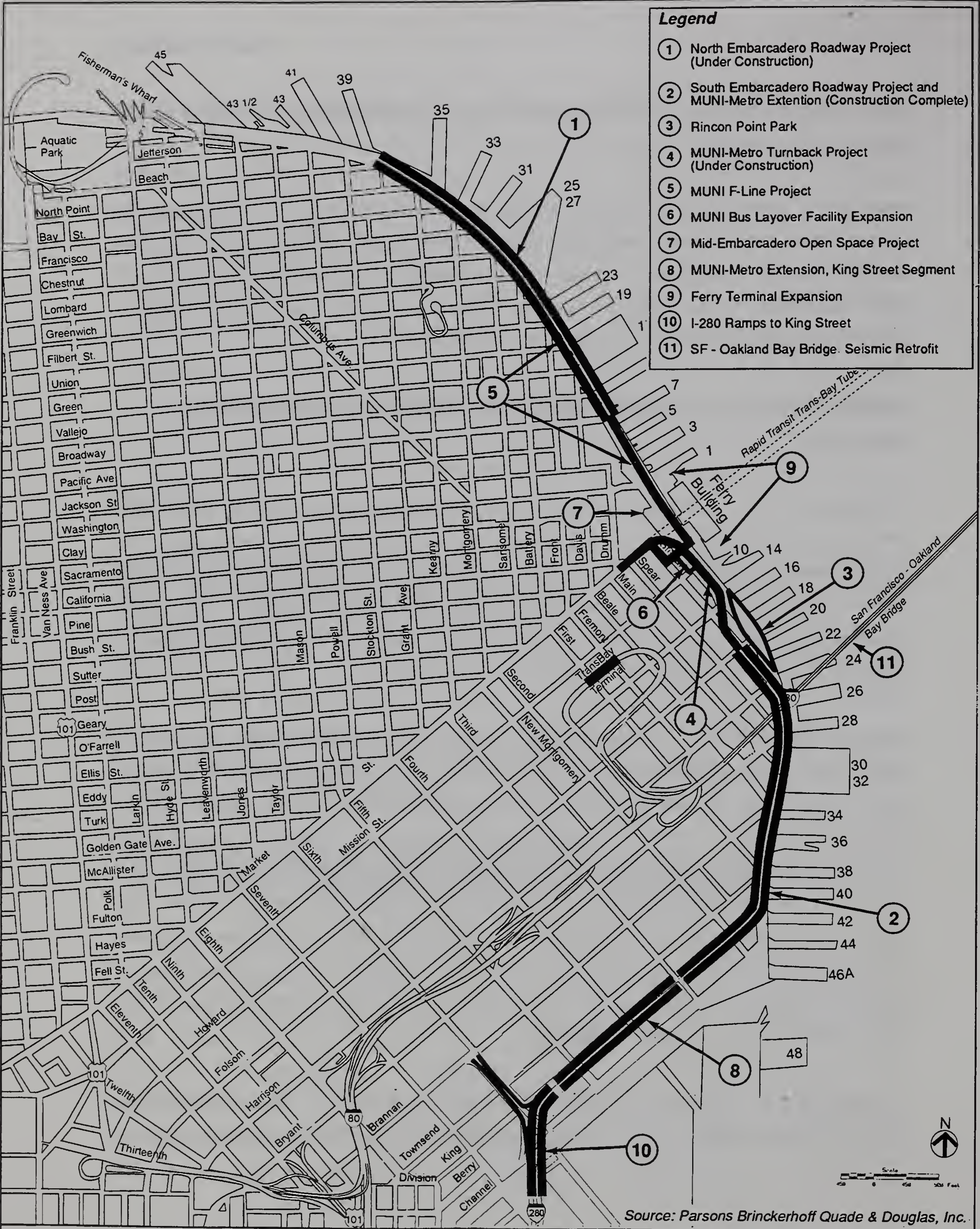
A number of "related projects" are discussed below and shown in Figure 2-8. These projects are not elements of the project alternatives, and their impacts are not analyzed in this EIS/EIR, but their presence would affect the design of the roadway. For "foreseeable future projects" and "other possible future projects," see the discussion of 2015 employment forecasts, pp. 221-227, and the traffic impacts section, pp. 304-314.

North Embarcadero and South Embarcadero Projects and Planned Rincon Point Park

The Embarcadero surface roadway along San Francisco's waterfront is planned as a boulevard with light rail and historic trolley service in its median. The planned roadway and transit improvements north of Broadway are elements of the North Embarcadero project, and those south of Folsom Street are elements of the South Embarcadero project. The South Embarcadero project was completed in July 1994. Completion of the North Embarcadero project is expected in late-1995.

According to the City's plan for The Embarcadero, the surface roadway between Harrison and Howard Streets is to be realigned towards the land side (westward) to accommodate the MUNI Metro Turnback and the Metro Extension in the roadway median (see description below). Northward from Harrison Street, the new Embarcadero alignment is to follow the Steuart Street alignment to a point approximately mid-block between Folsom and Howard Streets, and then curve toward the Bay to rejoin the existing Embarcadero alignment north of Howard Street. The land on the bay side of this new alignment, including that occupied by the existing roadway, has been planned to become a park known as the Rincon Point Park. The park would occupy an area approximately 1.9 hectares (4.7 acres) in size and has been planned as part of the Rincon Point/South Beach Redevelopment Plan.

The alternatives to replacement of the Embarcadero Freeway and the TSS are intended to provide continuity between the North Embarcadero and South Embarcadero projects.



Source: Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator

Related Projects

Figure 2-8

Therefore, all build alternatives would conform with the traffic lane configurations, sidewalk widths, transit design, and other roadway design features represented in the two adjoining projects at there respective points of connection with the proposed project. All build alternatives would also accommodate the planned Rincon Point Park. Under the No Build Alternative, sidwalk widths and other elements of the Embarcadero roadway would not be consistent with the North Embarcadero and South Embarcadero projects. Also, additional funds would be required to realign the roadway between Folsom and Howard Streets to allow creation of Rincon Point Park.

MUNI Metro Turnback and MUNI Metro Extension Projects

The MUNI Metro Turnback is a subsurface light rail facility between Market Street and Folsom Street. Construction of the Turnback began in the summer of 1993 and is estimated to be completed in late 1996. Light rail tracks and rail switching facilities are being constructed beneath the surface in the vicinity of Mission Street and The Embarcadero.

The MUNI Metro Extension is a double-track extension of the MUNI Metro light rail from the subway under Market Street, through a portal at The Embarcadero and Howard Street, southward on The Embarcadero and then westward on King Street to the Mission Bay area. A station stop is planned for The Embarcadero east of Hills Plaza, between Folsom and Harrison Streets, and east of the Delancy Street development, between Brannan and Townsend Streets. The surface segment along The Embarcadero between Folsom and Third Streets has been completed. The segment between Third and Sixth Streets is expected to be completed by 1996 or later. Construction of the portal and underground segment is underway. As described in the previous section, the existing southbound Embarcadero roadway between Folsom and Howard Streets would be realigned as part of the MUNI Metro Turnback project.

All alternatives to replacement of the Embarcadero Freeway and the TSS would accommodate the subsurface turnback, portal, and track extension, as well as the planned operation of MUNI Metro Extension stations.

I-280 King Street Ramps

Removal of the I-280 stub-end and Fourth Street off-ramp are planned by Caltrans. A new set of on- and off-ramps to/from I-280 are planned to connect directly into a redesigned King Street, touching down between Fifth and Sixth Streets. The MUNI Metro Extension tracks would be built in the median of the King Street (see above) following completion of the I-280 ramps.

MUNI F-Line Project

The MUNI F-Line is a planned surface rail historic trolley which would run eastward along Market Street, southward on Steuart Street, then eastward along the southern edge of Justin Herman Plaza, and northward along The Embarcadero, into the Fisherman's Wharf area. A median-running F-Line alignment north of Broadway is integral to the North Embarcadero project, which is currently under construction. Between Mission Street and Broadway, the F-Line alignment has also been planned as median-running, with double tracks in the Embarcadero roadway median, and station stops at the Ferry Building, Washington Street, and Broadway. All alternatives to replacement of the Embarcadero Freeway and the TSS would accommodate the F-Line, and have been analyzed assuming the planned median-running alignment.etro Extension stations.

At the suggestion of the City Planning Commission, a modified F-Line alignment was analyzed which would place the double tracks on the east side of the Embarcadero roadway between Mission and Washington Streets (i.e., in front of the Ferry Building) in order to provide easy access between the F-Line and the ferry terminal. While physically feasible, this variation would result in increased traffic congestion and transit vehicle delay, and could affect pedestrian and bicycle safety. For these reasons, and due to scheduling and funding constraints, this variation has been rejected by the City's Policy Steering Committee, which is comprised of Department heads and chaired by the Chief Administrative Officer. If the Port Commission, the Public Transportation Commission, and the Board of Supervisors were to nonetheless adopt the side-running F-Line variant, its impacts would be as described on pages 335-337.

MUNI Bus Layover Lot

The existing MUNI bus layover surface lot (located north of Mission Street, south of Justin Herman Plaza, east of Steuart Street, and west of The Embarcadero) serves as the terminus for 11 bus lines, which use electrical and diesel powered coaches. MUNI has plans to improve the configuration of this lot and expand it towards the Bay. The current size of this lot is approximately 3250 square meters (35,000 square feet) and the planned bayward expansion would add approximately 930 square meters (10,000 square feet) to its current size. Although planned for some time, the expansion still requires approval of the San Francisco Port Commission, which has jurisdiction over the land required for the expansion, and the planned expansion is not currently funded.

The No Build Alternative would not accommodate the planned expansion of the MUNI lot and the lot would remain operational in its current configuration. All build alternatives would accommodate MUNI's planned expansion of this facility.

Ferry Terminal Expansion

The Port of San Francisco has proposed increasing the number of berthing facilities for commuter ferries and excursion boats in the vicinity of the Ferry Building. The Ferry Terminal project would also include removal of parking at pier 1/2, and provision of a covered pedestrian walkway through the Ferry Building. Improvements to other features of the pedestrian environment, possibly including passenger pick-up and drop-off areas, would also be constructed.

Mid-Embarcadero Open Space Project

Parallel to the planning efforts for alternatives to replacement of the Embarcadero Freeway and the TSS, urban design concepts were developed by the San Francisco Department of City Planning working with the Citizens Advisory Committee for the Embarcadero Project (CACEP) and the City's Technical Advisory Committee. These concepts recommend treatment of the open spaces, recreational uses, public amenities, and other urban design improvements for the area. These urban design concepts will be further developed into an overall urban design plan. Urban design considerations played an important role in the formulation of replacement concepts for the Mid-Embarcadero roadway, and as a result, have influenced the design features of the various alternatives for the project; also, the current alternatives helped to define constraints and opportunities relevant to the development of urban design concepts for the project area.

SF-Oakland Bay Bridge Seismic Retrofit

The California Department of Transportation (Caltrans) plans to retrofit (seismically) five toll bridges in the San Francisco Bay Area. In the area of the proposed project, the SF-Oakland

Bay Bridge and its elevated western approach will be retrofitted to current seismic standards. Retrofit design for the Bay Bridge is currently underway.

The proposed project would accommodate the planned retrofit of the Bay Bridge and its western approach. Design of new freeway on- and off-ramps and widening of the I-80 freeway, proposed under Alternatives Three and Five, would be coordinated with the Bay Bridge retrofit design work.

Possible Future Transit Extensions

In addition to the related projects described above, two other transit improvements are possible in the area. One project involves the construction of a track connection between the F-Line and the MUNI Metro Extension. The track connection would run along The Embarcadero from the vicinity of Mission Street south to the MUNI portal at Howard Street. Tracks could be in traffic lanes and/or an exclusive right-of-way, depending on the number of tracks and their configuration. The track connection would allow F-Line vehicles to access the planned MUNI maintenance and storage facility south of Mission Bay via the MUNI Metro Extension tracks, but could be used for passenger service only with changes to transit vehicles or station platforms. The other project would extend MUNI's California Street Cable Car line from its existing terminus at the foot of California Street to the Ferry Building area.

Neither of these projects is currently identified in the Municipal Railway Capital Improvements Plan and there is currently no funding for their planning or construction. For these reasons, the analyses presented in the EIS/EIR do not assume the two transit extensions. None of the build alternatives would preclude these transit extensions, however, and all build alternatives would be designed to accommodate a future track connection between the F-Line and the MUNI Metro Extension.

2.4 APPROVAL REQUIREMENTS AND SAN FRANCISCO MASTER PLAN POLICIES

Following a public hearing before the City Planning Commission on the Draft EIS/EIR, responses to written and oral comments will be prepared and the San Francisco Board of Supervisors will select the preferred project alternative. The Draft EIS/EIR will be revised as appropriate and a proposed Final EIS/EIR will be presented to the City Planning Commission for certification as to accuracy, objectivity, and completeness. Certification of the EIR may be appealed to the Board of Supervisors. Following certification, the certified Final EIS/EIR will be available to local, regional, and state decision makers. The certified Final EIS/EIR will also be circulated for public review and will be referenced in the Federal Highway Administration's Record of Decision. No permits may be issued before the Final EIR is certified, and federal funds may not be obtained until after issuance of the Record of Decision.

At the local level, the proposed project would require approval from the San Francisco Board of Supervisors following approval by the Port Commission and a finding by the City Planning Commission that the project is consistent with the San Francisco Master Plan. The Planning Commission and other City Commissions may also make recommendations to the Board regarding approval or disapproval of the proposed project, and certain features of the project would require approval from various local commissions. The certified Final EIS/EIR would be available to all City Commissions, and would be used by the Port Commission and the Board of Supervisors in making their decisions on the project. Additional detail on specific local approvals and decisions are listed below:

The San Francisco Board of Supervisors would approve the project by resolution and/or ordinance, including authorization to accept and expend funds from State or Federal sources. The Department of Public Works would be the implementing agency for the proposed project.

The Port Commission Resolution 87-96 specifies guidelines for review, approval, and mitigation of public-agency-sponsored projects on Port lands, which include the Embarcadero Roadway. Review and approval are required at the schematic design review, working design review, and final review/contract documents stages.

The San Francisco Redevelopment Agency reviews projects within Redevelopment Areas, and would review portions of the project within the Rincon Point-South Beach Project Area and Golden Gateway Project Area.

The San Francisco Public Transportation Commission and the Parking and Traffic Commission would review the proposed project. Public Transportation Commission approval would be required for the F-Line alignment and extension of the 83-Pacific bus. Parking and Traffic Commission approval would be required for surface street changes, traffic operation changes, some on-street parking changes, and the signal timing upgrade proposed for Broadway, Stockton Street, and Grant Avenue.

The San Francisco Recreation and Park Commission has approval authority over all proposed alterations to park property under their jurisdiction, including any construction under park land. Any proposal resulting in the sale, discontinuance or abandonment of park property would require an amendment of the City Charter following approval of the electorate. California Public Resource Code Section 5400 states that public agencies that acquire open space for park use cannot later discontinue park use or establish a non-park use on that property. Section 4(f) of the Transportation Act of 1966 requires that Federal transportation agencies make a special effort to avoid 4(f) resources, which include public parks and historic sites. The San Francisco Recreation and Park Department was consulted regarding parks under their jurisdiction during development of the Draft Section 4(f) Evaluation which appears at the end of this document.

The San Francisco Art Commission was founded in 1932 to support and encourage community participation in performing and visual arts programs. It approves all works of art placed on City and County property and reviews the design of structures, viaducts, bridges, and the like erected over or on any street or public place. The Art Commission would review the entire project, although the Commission's jurisdiction does not technically extend to Port lands.

A detailed geotechnical investigation would be required during the final design of the selected alternative. For Alternatives Three, Four, and Five which propose elevated structures, a seismic study would also be required to develop seismic design criteria. The geotechnical investigation would likely involve drilling and/or other subsurface exploration methods, and would therefore require permits from the Port of San Francisco and the City's Bureau of Environmental Health. Permits would also be required for various other construction activities. A permit covering excavation, shoring, de-watering, and grading would be required from the Port of San Francisco. An encroachment permit would be required from the California Department of Transportation (Caltrans) for survey, sampling and construction activities within Caltrans' right-of-way.

De-watering effluent generated during construction activities would be discharged to the combined sewer system under a wastewater discharge permit, if possible. A permit would be issued by the Department of Public Works if the quality of the effluent meets standards. Prior to construction of the selected project alternative, sponsors would be required to file a Notice of

Intent (NOI) to comply with the NPDES General Permit for discharges of storm water (runoff associated with construction activities).

After approval at the local level, the proposed project would require approval of the Bay Conservation and Development Commission, and funding authorization by the California Transportation Commission and the Metropolitan Transportation Commission. At the Federal level, the project would require approval from the Federal Highway Administration. The EIS/EIR would be available to each agency and would be used by them in making decisions on the project. Additional detail on specific regional, state, and federal approvals and decisions are listed below:

The McAteer-Petris Act of 1965, as amended, grants the San Francisco Bay Conservation and Development Commission (BCDC) permit authority over San Francisco Bay and over shoreline lands located within 35 meters (100 feet) of the Bay. BCDC's management plan for the San Francisco Bay has been certified by the Federal Department of Commerce as the Coastal Zone Management Program for the San Francisco Bay Segment of the California Coastal Zone Management Program pursuant to the Federal Coastal Zone Management Act (CZMA). Under the CZMA, Federal projects and local projects that utilize Federal funding or require Federal approval must, to the maximum extent practicable, be consistent with a State's coastal management program if the project would affect the coastal zone. Thus, under the CZMA, BCDC's Federal regulatory authority may extend inland more than 35 meters (100 feet).

For project approval and funding, the project must meet the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). Agencies which will review the Draft EIS/EIR, include the Bay Area Air Quality Management District (BAAQMD), the California Air Resources Board (CARB), and the Federal Environmental Protection Agency (EPA).

Metropolitan Transportation Commission (MTC) Resolution 2270 Conformity Analysis requires that CO impact analyses for the years 2000 and 2010 be submitted to MTC for review. For a project to be approved, it must be shown that the project would eliminate or reduce the severity and number of violations of the federal 1-hour or 8-hour CO Ambient Air Quality Standards. The analysis would be prepared after selection of the preferred alternative. If the preferred alternative is not the same as the alternative programmed in the MTC's Transportation Improvement Program (TIP), then the preferred alternative must be programmed by MTC in the next TIP conformity assessment. The air quality conformity analysis must be accepted prior to the release of federal funding, and would be submitted to MTC after the EIS/EIR has been certified. MTC must verify that the project is consistent with Resolution 2270 prior to approval of funding.

Pursuant to Section 106 of the Historic Preservation Act of 1966, a Memorandum of Agreement (MOA) among the City and County of San Francisco, the Federal Highway Administration (FHWA), the State Historic Preservation Office (SHPO), Caltrans, and the Advisory Council on Historic Preservation (ACHP) would be required, describing procedures for the identification, evaluation, and protection of archaeological resources. The MOA will describe any additional archival research necessary and measures to be taken to reduce adverse effects of the project on archaeological resources. (See pp. 461-462 for more information.)

Because project implementation would require approvals from state agencies, the Draft EIS/EIR prepared for this project constitutes early notice to the State Historic Preservation Officer, pursuant to Section 5024.5(a) of California's Public Resources Code, of a project potentially affecting archaeological resources listed in or potentially eligible for listing in the California Register of Historic Resources.

In November 1986, the voters of San Francisco approved Proposition M, the Accountable Planning Initiative, which added Section 101.1 to the City Planning Code to establish eight Priority Policies. These policies are: preservation and enhancement of neighborhood-serving retail uses; protection of neighborhood character; preservation and enhancement of affordable housing; discouragement of commuter automobiles; protection of industrial and service land uses from commercial office development and enhancement of resident employment and business ownership; maximization of earthquake preparedness; landmark and historic building preservation; and protection of open space. Prior to issuing a permit for any project which requires an Initial Study under CEQA or adopting any zoning ordinance or development agreement, the City is required to find that the proposed project or legislation is consistent with the Priority Policies. The City Planning Commission, in its decision regarding Master Plan conformance, and the Board of Supervisors, in its decision regarding approval of the project, would make a determination of the project's conformance with the Priority Policies.

The City's Master Plan provides general policies and objectives to guide land use decisions, and contains some policies which relate to physical environmental issues. The proposed project would be reviewed by the City Planning Commission in the context of applicable objectives and policies of the San Francisco Master Plan. Some of the key objectives and policies are noted here.

Recreation And Open Space Element

Objective 2	Develop and maintain a diversified and balanced City-wide system of high quality public open space.
Policy 2.1	Provide an adequate and equitable distribution of public open spaces throughout the City.
Policy 2.2	Preserve existing public open space.
Policy 2.3	Preserve sunlight in public spaces.
Policy 2.6	Make open space accessible to people with special needs.
Policy 2.8	Develop a City-wide urban trails system that links City parks and public open spaces, hilltops, the waterfront and neighborhoods and ties into the regional hiking trail system.
Objective 3	Provide Continuous public open space along the shoreline unless public access clearly conflicts with maritime uses or other uses requiring a waterfront location.
Policy 3.1	Assure that new development adjacent to the shoreline capitalizes on its unique waterfront location, considers shoreline land use provisions, improves visual and physical access to the water, and conforms with urban design policies.
Policy 3.2	Maintain and improve the quality of existing shoreline open space.
Policy 3.3	Create a trail around the perimeter of the City which links open space along the shoreline and provides for maximum waterfront access.
Policy 3.4	Create a visually and physically accessible urban waterfront along the Embarcadero corridor between Fisherman's Wharf and China Basin.

Policy 3.5 Provide new public open spaces along the shoreline.

Transportation Element

Objective 1 Meet the needs of all residents and visitors for safe, convenient and inexpensive travel within San Francisco and between the City and other parts of the region while maintaining the high quality living environment of the Bay Area.

Policy 1.2 Ensure the safety and comfort of pedestrians throughout the City.

Policy 2.3 Design and locate facilities to preserve the historic city fabric and the natural landscape, and to protect views.

Policy 3.1 The existing vehicular capacity of the bridges, highways and freeways entering the City should not be increased and, for single-occupant vehicles, should be reduced where possible.

Policy 3.3 Develop and maintain an efficient system of arterials and thoroughfares to distribute traffic from regional freeways within and through San Francisco's street grid in conjunction with the Bay Region's nine-county Metropolitan Transportation System (MTS).

Policy 4.8 Expand and coordinate the use of ferries, water taxis and other forms of water-based transportation with each other and with landside transportation in waterfront communities in San Francisco and across the Bay, using San Francisco's Ferry Building as the main transfer point.

Policy 8.1 Ensure that the Coast Trail, the Bay Trail and the Ridge Trail remain uninterrupted and unobstructed where they pass through San Francisco.

Objective 11 Maintain public transit as the primary mode of transportation in San Francisco and as a means through which to guide future development and improve regional mobility and air quality.

Policy 14.1 Reduce road congestion through the implementation of traffic control strategies, such as signal-light synchronization and turn controls, that improve vehicular flow.

Policy 14.2 Ensure that traffic signals are timed and phased to emphasize transit, pedestrian, and bicycle traffic as part of a balanced multi-modal transportation system.

Policy 18.2 Design streets for a level of traffic that serves, but will not cause a detrimental impact on adjacent land uses.

Policy 18.5 Mitigate and reduce the impacts of automobile traffic in and around parks and along shoreline recreation areas.

Objective 19 Provide for convenient movement among districts in the City during off-peak travel periods and safe traffic movement at all times.

Objective 23 Improve the City's pedestrian circulation system to provide for efficient, pleasant, and safe movement.

Policy 23.2 Widen sidewalks where intensive commercial, recreational, or institutional activity is present and where residential densities are high.

Policy 23.7 Ensure safe pedestrian crossings at signaled intersections by providing sufficient time for pedestrians to cross streets at a moderate pace.

Policy 23.9 Implement the provisions of the Americans with Disabilities Act and the City's curb ramp program to improve pedestrian access for all people.

Objective 27 Ensure that bicycles can be used safely and conveniently as a primary means of transportation, as well as for recreational purposes.

Objective 30 Ensure that the provisions of new or enlarged parking facilities does not adversely affect the livability and desirability of the City and its various neighborhoods.

Objective 36 Promote freight delivery/pickup traffic as necessary for the economic vitality of San Francisco and the Bay Region.

Objective 40 Enforce a parking and loading strategy for freight distribution to reduce congestion affecting other vehicular traffic and adverse impacts on pedestrian circulation.

Urban Design Element

Policy 2.7 Recognize and protect outstanding and unique areas that contribute in an extraordinary degree to San Francisco's visual form and character.

Policy 4.8 Provide convenient access to a variety of recreation opportunities.

Northeastern Waterfront Element

Objective 8 To facilitate the movement of people and goods within the Northeastern Waterfront in such a way as to minimize the adverse impact of this movement.

Policy 8.1 Intercept and divert as much automobile traffic as feasible away from the water's edge and areas of intense pedestrian activity in order to make conditions more pleasurable, safe and interesting for the pedestrian, and in order to facilitate the commercial and recreational development of the area.

Policy 8.2 Limit additional parking facilities in the Northeastern Waterfront and minimize the impact of this parking. Discourage long-term parking for work trips which could be accommodated by transit. Restrict additional parking to: (a) Short-term (less than four hours) parking facilities to meet needs of additional business, retail, restaurant, marina and entertainment activities; (b) Long-term parking facilities for maritime activities, hotel and residential uses. To the extent possible, locate parking away from areas of intense pedestrian activity.

Policy 8.6 Remove or relocate inland those existing parking facilities on or near the water's edge or within areas of intense pedestrian activity.

Policy 8.7 Facilitate pedestrian access to the shoreline, including access for the handicapped, through the provision of convenient safe pedestrian crossings along The Embarcadero. Provide promenades and walkways of sufficient width to accommodate comfortably the movement of pedestrians throughout the Northeastern Waterfront.

Objective 9 To accommodate the regional movement of people and goods, permitting the through movement of traffic, access to the regional system from the maritime and other industrial areas of the City and facilitating the movement of regional transit while minimizing the adverse impact of this system on the Northeastern Waterfront area.

Policy 9.2 Prohibit any increase to the capacity of the roadway system along the shoreline to accommodate automobiles between the Bay Bridge-downtown area and the Golden Gate Bridge. Improve transit service in this corridor to encourage the reduction of automobile traffic.

Policy 9.3 Minimize the impact of regional transportation movement along the Northeastern Waterfront by encouraging transit use through the addition and improvement of service and through the use, wherever possible, of exclusive right-of-way and other types of transit preferential treatment. Prohibit ramping to and from the I-280 freeway within the area east of Third Street, except that a transit only ramp to Second Street should be provided.

Policy 9.5 Improve transit service to, and along, the Northeastern Waterfront. Establish a transit line between the South of Market area and the Fisherman's Wharf area which would primarily make use of existing railroad tracks, including those on The Embarcadero, and which would connect to numerous other transit lines, and to a parking reservoir at the southern end.

2.5 ALTERNATIVES WITHDRAWN FROM CONSIDERATION

2.5.1 MID-EMBARCADERO ROADWAY REPLACEMENT ALTERNATIVES WITHDRAWN FROM CONSIDERATION

During the public process conducted by the CACEP in 1991-1992 (see description of the CACEP process in Section 2.1.1), a great many ideas were considered in the development of alternative replacement concepts for the Mid-Embarcadero Roadway Replacement Project. The vast majority of these ideas were either variations on one or more of the generic alternatives eventually finalized by the CACEP, or ideas which focused primarily on urban design issues and which were based on the assumption of one or more of the generic transportation alternatives. There were, however, several replacement concepts which were either not discussed at length during the CACEP process because of an obvious lack of support from the participants, or were considered in detail but were not recommended by the CACEP for detailed analysis in this EIS/EIR. Also, there were several replacement concepts which were initially considered feasible for the Mid-Embarcadero replacement, but later became infeasible when integrated with the various Terminal Separator Structure alternatives. These replacement concepts, and the reasons why they were withdrawn from further consideration, are described in the following sections.

Replacement of the Elevated Embarcadero Freeway

One replacement alternative which was not considered at length during the CACEP process is the replacement of the Embarcadero freeway with a similar elevated structure.

As previously discussed in Section 2.1.1, the elevated Embarcadero Freeway was the subject of great public controversy since its plans were revealed in the early 1950s. The controversy only increased when it was built, and continued into the 1980s when the Mayor and the Board of Supervisors sought its removal as part of a larger waterfront transportation investment program. Although a ballot measure to remove the freeway was defeated in 1985 by a majority vote of San Franciscans, the damage inflicted by the Loma Prieta Earthquake in October 1989, once again placed the question of the freeway before the City's decision-makers.

In 1990, much of the public discussion centered on the comparative costs of the Mayor's proposal to remove and replace the elevated freeway with a series of ramps, surface, and subsurface improvements versus the cost of repairing and performing a seismic retrofit to the damaged freeway.

Caltrans eventually concluded that the cost of repairing and retrofitting the freeway would be greater than the cost of demolishing and replacing the freeway with a comparable structure. Based on this, the San Francisco Board of Supervisors, in a public hearing, endorsed the proposal set forth by the Mayor that the freeway be removed and replaced by a surface or subsurface roadway (Resolution No. 262-90, April 16, 1990). This conclusion also allowed the federal government to make a determination on the amount of Federal Emergency Relief funding which would be available for a replacement project -- an amount based upon the estimated cost of replacing the freeway with a facility of comparable capacity.

No established San Francisco neighborhood or interest group came forward during the 1991-1992 CACEP planning process to argue that an in-kind replacement should be considered as a replacement alternative. Only two individuals indicated support for an elevated freeway replacement during the EIS/EIR scoping process. While it would replicate transportation connectivity and service available before the earthquake, reconstructing the Embarcadero Freeway would recreate the physical intrusion of this structure on developing commercial and residential areas to the north and west. This would be in conflict with one of the purposes of this project, which is to maximize physical and visual access to the waterfront. Consequently, on the basis of both San Francisco policy actions and the public record of citizen involvement, it was determined that an elevated freeway replacement alternative need not be given further consideration in this EIS/EIR.

Full Subsurface Alternative

One alternative which received considerable attention prior to, as well as throughout the CACEP process, was the "fully subsurface" alternative. This alternative, as refined in several different ways through the CACEP work, resembled most closely, in October 1991, the original concept set forth by the Mayor and Board the previous year.

This alternative consisted of a subsurface section in front of the Ferry Building carrying three lanes of traffic in both the northbound and southbound directions. It also included a subsurface extension to the west at Washington Street, with traffic coming to surface grade just east of Drumm Street. Traffic from Clay Street seeking access to the southbound Embarcadero would access the intersection of Washington Street and The Embarcadero, on the surface, turn southward and immediately begin a descent into the subsurface section, rising again to meet grade north of Mission Street.

Several variations of this alternative were examined by the CACEP and City staff, including one in which the Clay Street traffic moved into a subsurface configuration west of Drumm Street and eventually merged (subsurface) with southbound Embarcadero traffic at a point northwest of the Ferry Building entrance.

The full subsurface alternative would fulfill one purpose of the project which is to maximize the efficiency of traffic movement while minimizing pedestrian and traffic conflicts. However, below-grade constraints, such as the presence of the old seawall, BART tube, and major existing sewer, transport, and storage lines, combined with geometric and dimensional limitations in the area, make a full subsurface configuration difficult or infeasible. Also, it was determined by the CACEP that the alternative had fairly severe urban design implications. The urban design problems resulted from the large amounts of land which would necessarily be dedicated to the areas where ramps would ascend and descend, particularly in the Ferry Building area. These considerations, in addition to the high capital cost implications (over $290 million), led to the decision to eliminate this alternative from further consideration. An eight-lane underground freeway connecting the Bay Bridge and the Golden Gate Bridge was proposed during the public comment period in September 1992. This freeway alternative was rejected for its high capital costs and for similar engineering constraints discussed above.

Single-Level Elevated Roadway

During the scoping process, one commentor proposed constructing a single-level, twenty-foot high elevated roadway from the Terminal Separator Structure to just north of Broadway, following essentially the same alignment of the former Embarcadero Freeway. The elevated roadway structure would have two to four lanes in each direction. Ramps would extend from the elevated roadway to touch down on The Embarcadero just north of Broadway, on Clay and Washington Streets, and on Broadway. The elevated roadway would be designed to separate high speed vehicular traffic from transit, pedestrian, and local access/service traffic which would be accommodated at the street level beneath the elevated roadway structure.

Although the elevated roadway in this alternative would be only one-third as high as the Embarcadero Freeway structure, it would be another elevated structure along the San Francisco waterfront and would likely be subject to much of the same controversy and public objection as the Embarcadero Freeway. The alternative had garnered little public support. Also, as with the replacement of the fully elevated freeway structure, it would be in conflict with the project objective to maximize physical and visual access to the waterfront. Based on the same considerations discussed earlier for an elevated freeway replacement alternative, this alternative was not analyzed further.

Partially Subsurface Alternatives

Due to the infeasibility of the full subsurface roadway alternative and continued public interest in some manner of subsurface roadway, two partially subsurface alternatives were initially selected for detailed study. In the long tunnel option, three northbound lanes would descend into a subsurface tunnel via a 120-meter-long (400-foot-long) portal, north of Howard Street; the fourth lane would remain on the surface for access to the Ferry Building and piers. The tunnel section would be between Mission and Washington Streets, approximately 460 meters (1,500 feet) in length. The three subsurface northbound lanes would expand to four lanes below grade north of Mission Street. Two of these lanes would emerge north of Washington Street on The Embarcadero adjacent to Piers 1, 1-1/2, and 3, and two lanes would emerge on Washington Street, west of Drumm Street. The southbound roadway would remain on the surface.

The long tunnel option was subsequently eliminated from further consideration because of physical and operational constraints, as well as its high cost ($260 million). The location of the underground segment south of Mission Street would conflict with the MUNI Metro Turnback portal. The configuration of the MUNI Metro Turnback portal would also preclude construction of a surface road for access to the Ferry Building between the portal and the Bay. The long tunnel option also suffered from operational shortcomings. The northbound direction would have four lanes in the subsurface section, two of which would continue as The Embarcadero and two would diverge onto Washington Street. There would be a limited distance provided in the tunnel for motorists to select their desired lane set, forcing a high volume of vehicles to attempt to change lanes within a limited space. This "weaving" condition would reduce the capacity and level-of-service of the roadway, partially defeating the purpose of the subsurface grade separation.

In the short tunnel option, the 120-meter-long (400-foot-long) entrance portal to the tunnel segment for the northbound traffic lanes would begin just north of Mission Street, and the exit portal would emerge approximately 120 meters (400 feet) south of Washington Street. There would be no subsurface connection to Washington Street. Two of the three lanes from the portal would continue north of Washington Street to Broadway; the third lane would expand into two left-turn lanes south of Washington Street. The southbound roadway would remain on the surface.

The short tunnel option was withdrawn from further consideration for its effect on pedestrian movement and its high cost. While providing a pedestrian plaza, the option does not eliminate all traffic conflicts for pedestrians since the southbound lanes and the single northbound lane providing access to the Ferry Building and the waterfront would still be on the surface. In addition, there would be 140-meter- (450-foot-) long pedestrian barriers at the two tunnel portals at both ends of the pedestrian plaza, further impeding pedestrian flows crossing The Embarcadero. The option would cost $60-80 million for the underground section and would eliminate only the Market Street traffic signal for northbound traffic, providing little improvement to traffic flow.

Other Suggestions Regarding Treatment of The Embarcadero Roadway

In addition to the exploration and refinement of roadway alternatives, many of the ideas suggested by citizens were not primarily of a transportation nature, but rather had to do with urban design considerations at Justin Herman Plaza and/or treatments of the space created by the removal of the Embarcadero Freeway.

One such proposal suggested that an elevated pedestrian platform be constructed over a surface roadway in front of the Ferry Building. The elevated platform would provide pedestrian connection between the second floor of the Ferry Building and a surface plaza west of the surface roadway (via steps). This proposal would allow pedestrians to access the Ferry Building through the second floor of the building, thus both "hiding" the traffic movement from the plaza west of the roadway and removing any pedestrian/traffic conflict. However, other than the elevated crossing provided for pedestrians, this suggestion basically incorporates a surface roadway alternative. Although the elevated structure, or platform, attached to the west side of the Ferry Building would obviate the need for a signal at The Embarcadero and Market Street, it is more an urban design consideration than a transportation consideration.

A similar proposal, received after the original EIS/EIR scoping process, would partially depress the roadway under Justin Herman Plaza and adjacent areas, and construct a podium for new development above the roadway. This proposal would encroach on existing park land and would be contrary to the project's purpose and need by introducing new development into newly opened views of the Bay.

Another proposal suggested construction of an at-grade southbound roadway which would skirt the west side of a semi-circular plaza in front of the Ferry Building. In this proposal, the northbound roadway would descend into a tunnel segment north of Mission Street, continue under the plaza through the Ferry Building area, and emerge to grade south of Washington Street. A trolley track loop would be accommodated within the plaza, which would link the Market Street trolley lines with the planned trolley services in the median of The Embarcadero north and south of the Ferry Building. Several individuals also suggested extending the California Street cable cars to the foot of Market Street or across the southbound lanes of The Embarcadero to a new terminus in the plaza. The plaza concept received considerable discussion among members of the CACEP and was recommended by CACEP for detailed study in the EIS/EIR.

The plaza concept would have various transportation implications as well as urban design implications. One of the transportation issues associated with this proposal was that the size and shape of the proposed plaza would cause a short curvature in the southbound roadway alignment, which would present unsafe traffic conditions for both motorists and pedestrians in the plaza area, or would interfere with the transportation functions the roadway is intended to serve. Also, the underground segment would have the effect of creating pedestrian barriers at the two portals where the northbound roadway descended below grade. After considerable debate, the City staff recommended, and the Policy Steering Committee (PSC) selected, a modified version of the original proposal for further consideration. This alternative has since been modified to better meet the project purpose of restoring transportation service lost due to the removal of The Embarcadero Freeway, and is presented as Alternative Five in this analysis.

Another plaza treatment proposal called for the alignment of all lanes of The Embarcadero roadway to continue along Steuart Street, north from Howard Street and across Market Street through the northern portion of Justin Herman Plaza to connect with the existing Embarcadero alignment near Pier One, creating a large pedestrian and transit plaza east of the new roadway alignment. Market Street would be opened to The Embarcadero for motorist and transit (either street cars or cable cars). This proposal would require redesign of Justin Herman Plaza and would use portions of the Plaza for roadway and transit uses. In addition, cable cars crossing The Embarcadero to reach a new terminus in the pedestrian plaza would interfere with traffic and traffic signal progression and could conflict with the planned F-Line light rail.

Several individuals suggested opening Market Street to through traffic, so that cars could directly access The Embarcadero. This proposal would require use of portions of Justin Herman Plaza for roadway and could create more conflicts between cars and pedestrians and cars and transit vehicles. The proposal might also violate the City's " transit first" policy by increasing the attractiveness of Market Street to through traffic.

Other alternatives were not given extensive consideration because they did not meet basic parameters set by regulatory requirements. For example, one proposal was to construct a new surface roadway to the east of the Ferry Building, thus removing all pedestrian/traffic conflicts from the plaza area west of the Building. This would interfere with ferry service and would involve a substantial amount of fill into the San Francisco Bay, which is inconsistent with the policies of the Bay Conservation and Development Commission (BCDC), which has regulatory authorities over any proposed uses affecting the Bay. In this case, recognition of long-standing policies of the BCDC effectively precluded this suggestion from further consideration.

2.5.2 TERMINAL SEPARATOR STRUCTURE ALTERNATIVES WITHDRAWN FROM CONSIDERATION

In April 1993, the Mayor's Task Force for Terminal Separator Structure/Transbay Terminal initiated a study to identify alternatives for the TSS replacement. The Task Force, made up of City staff, Caltrans staff, and a Citizens Advisory Committee representing the local community, evaluated more than twenty proposals for the TSS replacement.

Following is a brief, and general, description of some of the rejected proposals for the TSS and the reasons why they were rejected.

- Proposals with ramps crossing over the Transbay Terminal (TBT) ramps and touching down west of Main Street and south of Howard Street. The touch-down ramps in these proposals could not meet Caltrans' grade and elevation standards. In other words, the crossing could not be accomplished with a grade of eight percent or less while maintaining minimum vertical clearances of 5 meters (16.5 feet).

- Proposals with an eastbound off-ramp crossing over the upper deck of the Bay Bridge and touching down at Folsom or Harrison Street. Again, grade and elevation standards could not be met.

- Plans calling for the removal or relocation of the Transbay Terminal and/or the removal or relocation of its ramps, or both. Potential changes to the TBT are currently the focus of a preliminary feasibility study and are too speculative to assume in the development of ramp alternatives. (See possible future projects discussion, pp. 304-314.)

- Plans advocating the underground placement of a ramp or the significant lowering or elevation of a City street. These ideas were thought to be too costly and too disruptive to local traffic circulation.

By July 1993, the Task Force had identified seven viable alternatives, ranging from full rebuild to modified full rebuild and partial rebuild of the TSS (Terminal Separator Structure/Transbay Terminal: Report to the Mayor, July 26, 1993). The Task Force Study found that there are viable alternatives to the full replacement of the TSS which may better serve San Francisco's goals to accommodate traffic on existing streets, minimize intrusion of new facilities into established properties and provide land, formerly occupied by the TSS, for redevelopment. Subsequently, the San Francisco Board of Supervisors adopted Resolution 99-94 advising Caltrans that the City is not supportive of any further efforts for a full, in-kind rebuilding of the TSS and alternatives proposing such would not be analyzed further.

At the Scoping Meeting for the combined Mid-Embarcadero and Terminal Separator Structure alternatives, public input was solicited on seven possible alternatives, including two which would have rebuilt the TSS. No one spoke at the public scoping meetings or wrote during the comment period to explicitly support rebuilding the Embarcadero Freeway and/or the TSS as they were before the Loma Prieta Earthquake. The lack of public interest combined with the visual blight and physical intrusion associated with elevated structures, and their large land requirements, removed the full rebuild alternative from consideration following public scoping and comment periods.

During the scoping process several additional proposals were offered by members of the public. A proposal was received that suggested building a new surface roadway on the right-of-way of the TSS. This was rejected because it would provide a relatively ineffective increase in capacity parallel to Folsom Street at the expense of large portions of land suitable for residential and/or commercial development. If the new surface roadway were a landscaped boulevard with limited intersections, local circulation would be adversely affected by cul de sacs at the ends of Fremont, Steuart, and Spear Streets, and costly bridges or tunnels at Main and Beale Streets.

One plan advocated construction of a new off-ramp from the Bay Bridge, merging onto the south side of Folsom Street so that the ramp would no longer cross Folsom. This proposal would require closure of the First Street on-ramp to the Bay Bridge. First Street would remain open to local traffic only and the intersection of First and Folsom Streets would be eliminated. All bridge-bound traffic would be diverted to a new four-lane on-ramp at Essex Street.

This proposal was rejected because the Folsom Street off-ramp could not meet Caltrans grade and elevation standards. In addition, Essex Street would have to be lowered beneath Folsom Street and Howard Street would have to be elevated, a costly and disruptive process.

Another proposal, received after the scoping process, suggested extending the existing Fremont Street off-ramp to Howard Street at Main Street and allowing traffic getting on the freeway to use the Transbay Terminal ramps. This proposal was rejected due to its displacement of transit vehicles from the Transbay Terminal ramps, and its potential to affect local circulation on Howard Street, a transit preferential street as identified in the City's Master Plan.

Two proposals suggested the construction of remote or satellite parking garages, linked to the planned MUNI F-Line or other transit service in lieu of or supplementing other transportation improvements. One proposal suggested a garage location near Beale and Folsom Streets and another recommended a location within the right-of-way of the former TSS or Embarcadero Freeway. The satellite parking garage proposals were suggested as a means to intercept automobile traffic bound for Chinatown or North Beach and transfer passengers to higher occupancy transit vehicles.

Intercept parking is generally provided at the periphery of congested urban areas. Commuters who would otherwise drive to their final destinations transfer to public transit at these locations, their chief benefit being travel time savings. Intercept parking facilities for San Francisco can operate successfully if provided at the periphery of downtown congestion and freeway bottlenecks. However, to access a parking garage at the proposed locations, drivers would have to go through the congested freeways (I-80, I-580, I-880 and the Bay Bridge from the East Bay, and U.S. 101 and I-280 from the South Bay) then exit to freeway off-ramps in the downtown area. Drivers who have not been intercepted prior to the congestion points are unlikely to park in remote facilities because it would be faster using City streets to get to their destination by automobile rather than public transit. The proposed locations of the intercept parking garage are three to five blocks away from Third and Fourth Streets, the corridors used by Chinatown-serving transit routes, and the long walking distance to get to the transit stops serving the garage, would also limit the number of visitors willing to use the facility[1].

The San Francisco Department of Parking and Traffic (DPT) in cooperation with parties in Chinatown, began a demonstration project in late 1990 that evaluated intercept parking at the Golden Gateway garage linked to Chinatown and North Beach by shuttle buses. The shuttle service was reduced from seven days a week to weekends only after the first year because of light patronage, and will be discontinued in the near future[2].

There is a high concentration of parking garages and surface lots in the vicinity of downtown and the South of Market areas. A 1991 survey indicated a 70 percent occupancy rate for parking in the greater downtown area and the South of Market Area (where the proposed garage would be located).

One proposal focused on transit improvements in the northeastern portion of the City, including North Beach and Chinatown. The proposal would extend the planned F-Line light rail beyond Pier 39 along Jefferson Street to Taylor Street at Fisherman's Wharf. From here, the LRT line would travel southeast on Columbus Avenue to Washington/Clay Streets, east on Clay Street, and Caltrans right-of-way back to The Embarcadero. Trains would operate on clockwise and counter-clockwise loops similar to the MUNI 42-Line. The proposal would also establish a shuttle bus system serving the northeast area and extend the MUNI 83-Line to connect with the F-Line at The Embarcadero.

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[1] Memo from Rana Ahmadi to Hillary Gitelman, San Francisco Planning Department, July 27, 1994. A copy of this memo is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

[2] Personal communication with Bond Yee, April 18, 1995, San Francisco Department of Parking and Traffic.

The proposed MUNI 83-Line extension would be considered by MUNI staff and the Public Transportation Commission. The proposed F-Line extension was not considered further for several reasons. First, the F-Line is currently proposed to extend to Jones Street, one block past Taylor Street. Second, the proposed rail line on Columbus Avenue could only operate by imposing restrictions on the high volume of vehicle traffic. There are no major thoroughfares parallel to Columbus Avenue capable of either absorbing vehicular traffic diverted off Columbus or capable of accommodating the proposed light rail line. The light rail service via Columbus Avenue also seems unlikely to generate sufficient ridership to justify a multi-million dollar capital project.

A study of rail transit service to Chinatown and possibly Fisherman's Wharf, however, has recently been suggested for Proposition - B funded corridor projects, specifically in the context of the "Long Range Fixed Guideway Plan" being prepared for the San Francisco County Transportation Authority, with input from MUNI staff. A subway service may be evaluated as a possible extension of the proposed Bayshore Light Rail Project. This would follow under Stockton, Grant, or Kearny Streets to Chinatown and possibly beyond under Columbus Avenue to Fisherman's Wharf. This proposal would serve many transportation functions, including the high volumes of passengers who now use the Stockton Street buses (Lines 9X, 30, 45)[3].

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[3] Memo from Peter Strause, San Francisco Municipal Railways, to Jennifer O'Connor, San Francisco Department of Public Works, June 29, 1994. A copy of this memo is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

3. AFFECTED ENVIRONMENT

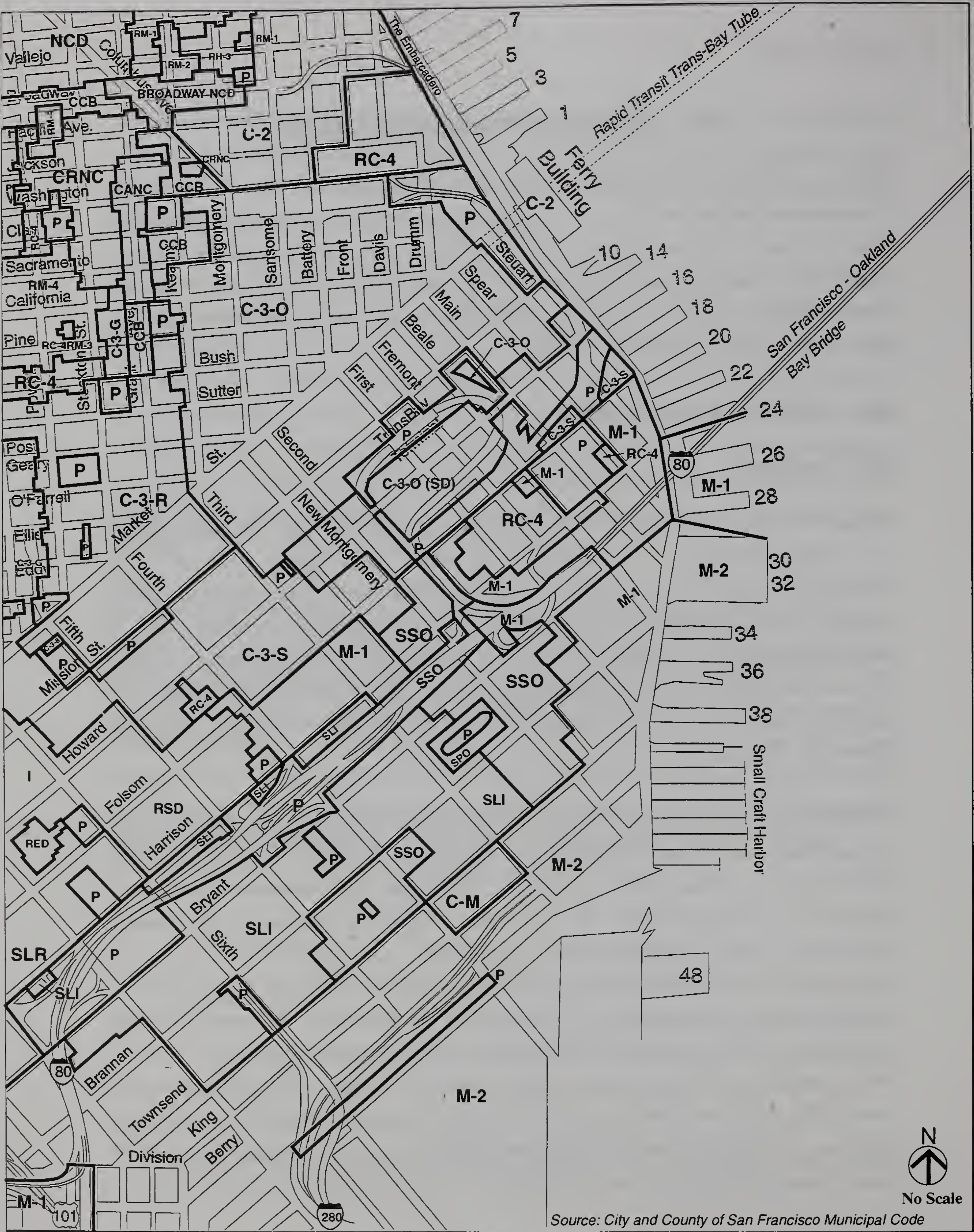
This section describes the general environmental conditions which currently exist in the vicinity of the proposed project, as well as the conditions that existed in the area prior to the 1989 Loma Prieta Earthquake. This section establishes the general baseline for the analyses in Section 4: Environmental Consequences and Mitigation Measures. For some topics, Section 4 contains some additional baseline data regarding pre-earthquake and existing conditions in order to allow an understanding of potential impacts.

3.1 LAND USE AND ZONING

3.1.1 ZONING

Just as there were prior to the 1989 earthquake, there are currently a variety of zoning districts and height/bulk districts in the vicinity of the project. (See Figures 3.1-1 and 3.1-2.) Predominant zoning districts include C-3-O (Downtown Commercial-Office), C-3-S (Downtown Support), C-3-R (Downtown Commercial-Retail), and C-2 (Community Business). The C-2 district encompasses Port properties on the east side of the Embarcadero roadway between Broadway and Harrison Street, in addition to some inland areas west of The Embarcadero near Broadway. Public Use (P) districts designate areas with transportation facilities, parks, and government office buildings.

Residential zoning districts occur in parts of North Beach, Chinatown, the Golden Gateway redevelopment area, the South of Market Area (SOMA) and the Rincon Hill special use district (see Figure 3.1-3). These districts include RM-2 (Residential, Mixed-Moderate Density), RH-3 (Residential, House-Three-Family), RC-4 (Residential-Commercial Combined, High Density), and pockets of RM-4 (Residential, Mixed-High Density). The remainder of the study area includes M-1 (Light Industrial) districts (on the east side of the Embarcadero roadway between Greenwich Street and Broadway, and in the vicinity of the Bay Bridge), M-2 (Heavy Industrial) districts (south of the Bay Bridge), the North Beach and Broadway Neighborhood Commercial Districts (NCDs), and various South of Market Mixed-Use Districts (SSO (Service/Secondary Office), SPD (South Park District), and SLI (Service/Light Industrial)). Height limits in the vicinity vary from 12 meters (40 feet) to 152 meters (500 feet) maximum, and bulk designations determine required setbacks on larger buildings.

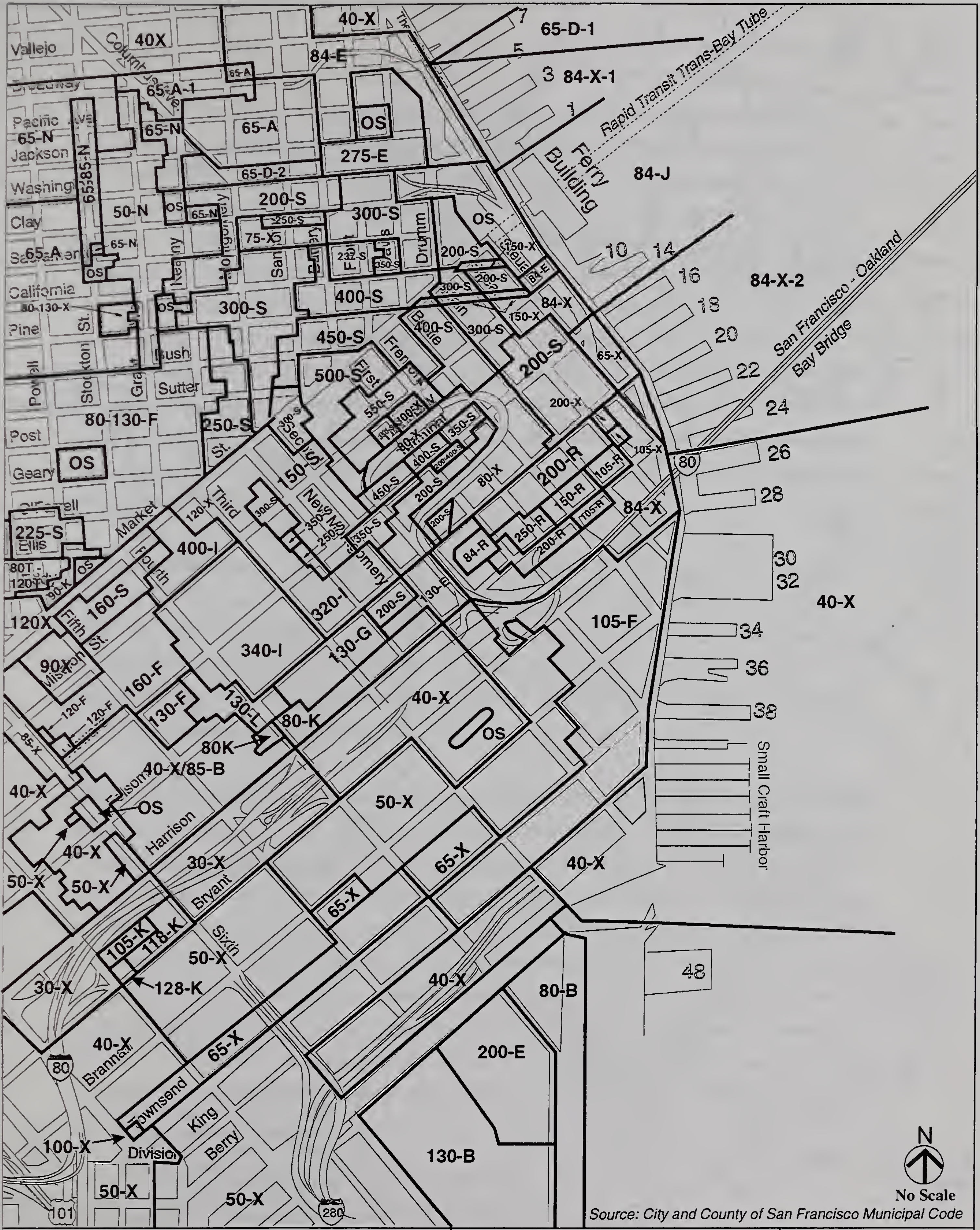


Source: City and County of San Francisco Municipal Code

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

Zoning Districts

Figure 3.1-1

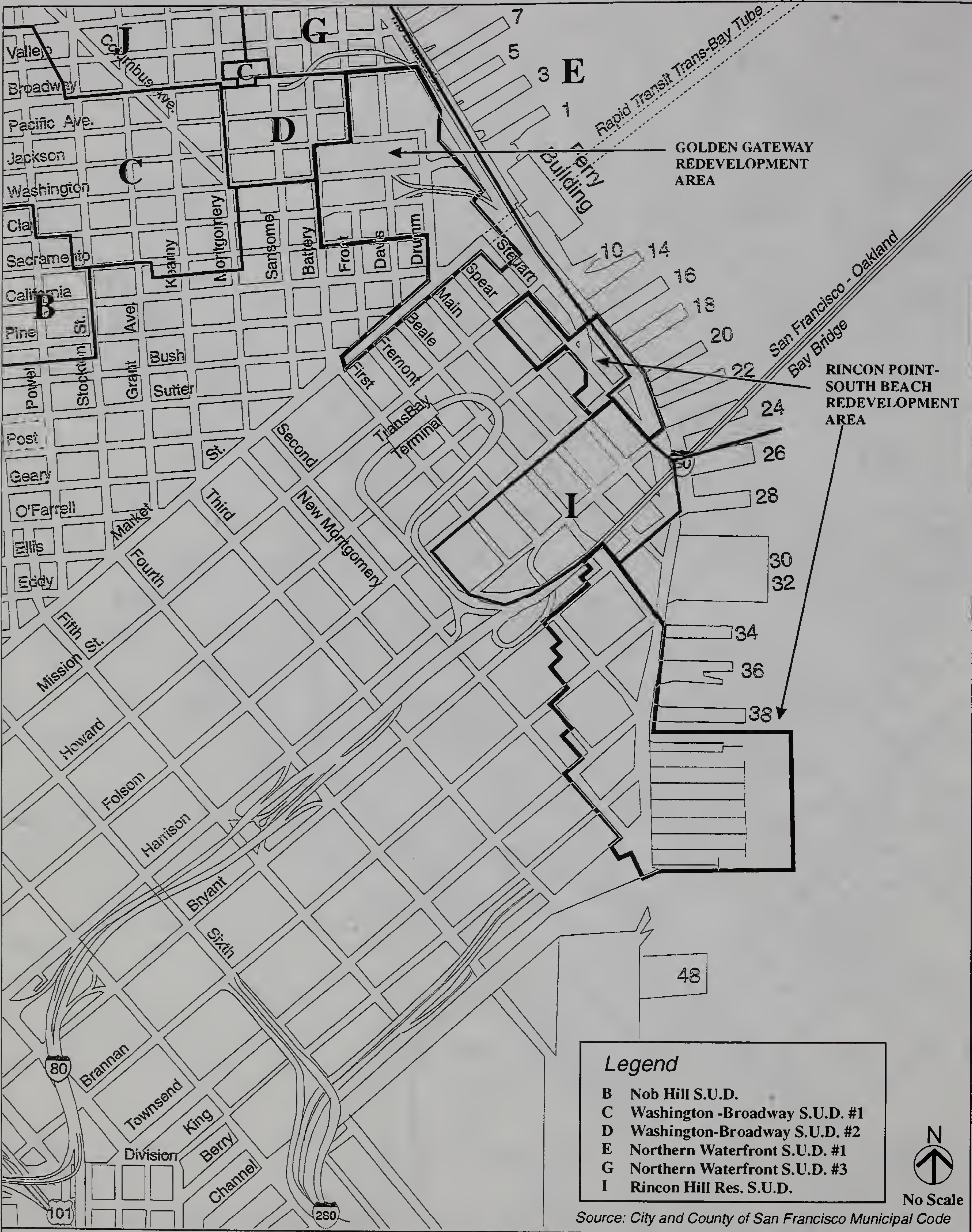


Source: City and County of San Francisco Municipal Code

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

Height and Bulk Districts

Figure 3.1-2



Source: City and County of San Francisco Municipal Code

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

Special Use Districts and Redevelopment Areas

Figure 3.1-3

Overlays on the zoning and height/bulk designations include Special Use Districts and Redevelopment Areas (see Figure 3.1-3). In the vicinity of I-80 and the former TSS, the Rincon Hill Special Use District (SUD) contains controls intended to promote conversion of an underutilized industrial area to "a unique residential neighborhood close to downtown which will contribute significantly to the City's housing supply, create tapered residential buildings, provide an appropriate mixture of retail sales and personal services to support new residential development, provide a buffer of office and parking use between the bridge and freeway ramps and the housing sites, and allow the existing industrial, service and office uses to remain."[1] In the vicinity of the former Broadway ramp to the Embarcadero Freeway, the Washington-Broadway SUD contains controls intended to "provide for certain areas with special traffic and parking considerations, many existing buildings of small scale and established character which have been and will be retained and converted, and certain wholesaling activities carried on with distinct benefit to the City."[2]

The Northern Waterfront SUD, located to the north and east of Telegraph Hill (not shown in Figure 3.1-3), contains controls intended to "provide certain areas with unique natural and man-made physical characteristics, distinct maritime character special traffic, parking and use considerations, recognized development potential, and proximity to residential, public and commercial areas of regional, national and international significance which should be protected from adverse adjacent development."[3]

The Golden Gateway Redevelopment Plan was adopted in 1959 and has been fully implemented, including construction of 1,400 residential units and partial financing of the Embarcadero BART Station. The Rincon Point-South Beach Redevelopment Plan was adopted in 1981 with the following primary objectives, and has largely been implemented: (1) removal of blight and other impediments to land development; (2) stimulating and attracting private investment; (3) providing for the creation of two waterfront parks; (4) providing for job opportunities through specific economic development improvements; (5) providing for and facilitating the partial re-routing and the overall improvement of The Embarcadero Roadway into a boulevard, including a new mass transit line; (6) assisting in relocation of displaced residents and businesses; (7) encouraging energy efficiency; and (8) providing for the development of mixed-income housing. In 1991 the plan was amended to change the land use designation at four development sites within the plan area, including specific re-use plans for the historic Oriental Warehouse at Delancey (First) and Brannan Streets.

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[1] City and County of San Francisco City Planning Code, Section 249.1.

[2] City and County of San Francisco City Planning Code, Section 239.

[3] City and County of San Francisco City Planning Code, Section 240.3.

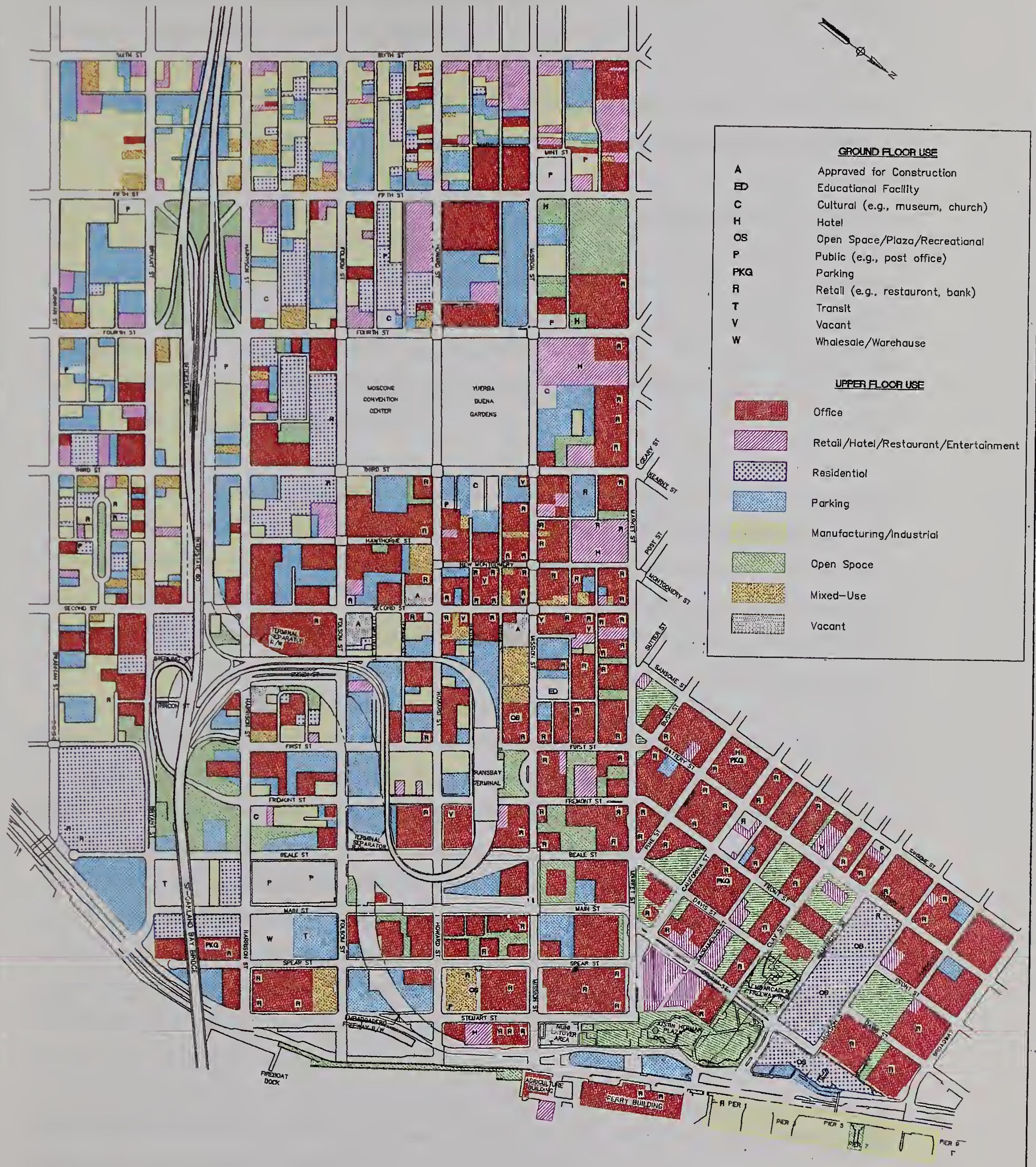
3.1.2 LAND USE

Existing land uses in the vicinity of the project include a diverse mix of commercial office, retail, residential, institutional, cultural, warehouse, maritime-related, light industrial, manufacturing, wholesale, governmental, hotel, entertainment, and open space (see Figure 3.1-4). Market Street, which diagonally bisects the primary study area and is arguably San Francisco's "Main Street," demarcates the border between the Financial District to the north and the South of Market Area (SOMA) to the south. For ease of description and in line with local custom, the northeast-southwest oriented streets such as Mission and Howard Streets are considered as east-west streets in this report, and the northwest-southeast oriented streets such as Fourth and Fifth Streets are considered as north-south streets.

The C-3 (Downtown Commercial) districts of downtown San Francisco represent the largest concentration of commercial activity and employment in the Bay region. The four principal kinds of commercial uses downtown are office, retail, hotel, and support commercial. Downtown offices are home to corporate headquarters, financial institutions, insurance companies, business and professional services, and other similar commercial enterprises. Many office towers have ground level retail establishments and open space plazas.

The Northeast Waterfront area is part of a larger maritime and industrial district that has undergone substantial change in the last 25 years. Many of the area's architecturally-rich brick and concrete structures were preserved and converted to office, design-related businesses and retail service in the late 1970s and early 1980s. During the same period, the area also experienced housing development.

The Ferry Building provides a transition between Port land uses north and south of Market Street, as well as a centerpiece and visual focus for Market Street and The Embarcadero itself. The Ferry Plaza area on the waterside of the Ferry Building, contains restaurants, the Golden Gate Ferry Terminal, mechanical access to BART tubes and public open space. Landing facilities and piers for the East Bay, Vallejo, and Tiburon ferry support services are located north of the Ferry Building at Pier 1/2. Pier and bulkhead buildings at Piers 1, 1-1/2, and 3 contain office and parking areas. Other uses of Port property in the Ferry Building area including



No Scale

Source: Public Affairs Management

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator	Land Uses in Vicinity of Proposed Project	Figure 3.1-4

offices, restaurants, retail, parking, public access and a service station. The Embarcadero Freeway was a dominant land use element in the area before the Loma Prieta Earthquake. Following the removal of the Embarcadero Freeway the Saturday Farmer's Market was established and operates each Saturday (9:00 AM. to 2:00 PM.) in the Embarcadero roadway median in front of the Ferry Building.

On the west side of the Embarcadero corridor, opposite the Ferry Building, is the terminus of Market Street, Justin Herman Plaza, and the MUNI bus layover parking lot. There are also ground-level and mezzanine-level retail and service establishments located at Embarcadero Center, the Hyatt Regency Hotel, One Market Plaza and Rincon Center. On the block bounded by Steuart Street, Mission Street, Howard Street and The Embarcadero, the mix of land uses includes ground-level retail and restaurant establishments, hotels, offices and the Embarcadero YMCA.

The Golden Gateway Center is an urban mixed-use residential neighborhood located along the south side of Broadway and extending south to the downtown business district, adjacent to Port property. The Center contains underground parking, mezzanine-level commercial businesses and resident-serving business. There are two to three stories of residential development on top of the commercial uses, and two high-rise residential towers at the south end area, adjacent to the Financial District.

Assessor's Blocks 202 and 203 (west of The Embarcadero between Clay and Washington Streets) contained the Clay Street and Washington Street Embarcadero Freeway ramps, and are currently landscaped open space surrounded by Golden Gateway and Embarcadero Center buildings. Blocks 139, 140 and 141 (bounded by Vallejo Street, Battery Street, Broadway and The Embarcadero), and Block 165 (south of Broadway between Sansome and Battery Streets) contained the Broadway Embarcadero Freeway ramps amongst areas of low-rise commercial development; these blocks currently contain vacant land and surface parking, and one- to four-story commercial buildings. In this portion of the study area, the Embarcadero Freeway was a dominant land use element and physical structure before the Loma Prieta Earthquake.

The Battery-Sansome corridor extends from Market Street north to The Embarcadero, and operates as the key north-south arterial connecting the downtown with the northern waterfront. The buildings between Broadway, The Embarcadero, the east slope of Telegraph Hill, and Port property (not shown in Figure 3.1-4), are included in the Northeastern Waterfront Historic District, the boundaries of which include many Port seawall lots in this area.

The South of Market Area (SOMA), which has its eastern border adjacent to the Embarcadero corridor, is different from other parts of San Francisco in several respects. The street pattern is skewed approximately 45 degrees from the typical north-south and east-west orientation of most San Francisco street grids. The SOMA is generally flat, and blocks are the largest in the City, measuring approximately 251 meters (825 feet) on the east-west streets and 168 meters (550 feet) on the north-south streets. Through conversion and new construction, parts of SOMA (particularly in the vicinity of First Street) which have historically supported printing, wholesale and light-industrial uses, are becoming increasingly office oriented, although examples of the original use types remain. Land uses in SOMA differ from the Financial District in density, diversity of use and scale of development.

Assessor's Blocks 3740, 3741, and 3742 (located to the west of The Embarcadero and north of Folsom Street) formerly contained ramps connecting the elevated Embarcadero Freeway to the Terminal Separator Structure. Other land uses on these blocks include surface parking, a parking structure, and low- to mid-rise office buildings. Between Main and Second Streets, Assessor's Blocks that contained the Terminal Separator Structure facility (3718, 3736, 3737, 3738, 3739, 3749, and 3764) are currently used for surface parking or are vacant. The Terminal Separator Structure was, and the bus ramps to the Transbay Terminal continue to be, a major land use in this part of the SOMA.

Between Folsom Street and I-80, from Second Street to the waterfront, this part of the SOMA (known as Rincon Hill) contains a diverse mixture of land uses, although industrial buildings and surface parking predominate. The renovated Hills Plaza, located at the easternmost portion of the hill, contains a mix of ground floor restaurant, retail and child care, and upper floor office and residential uses. To the west of Hills Plaza, there are warehouses, parking for Golden Gate Transit buses, and a U.S. Post Office facility. The Baycrest Condominiums, located at Harrison and Beale Streets, substantially completed at the time of the Loma Prieta Earthquake, is one of several new residential developments in this part of the SOMA. Situated between Second Street and the Transbay Terminal ramps is Marathon Plaza, an office complex whose design was influenced by its proximity to the former TSS (this was also true for Bayside Plaza, located at Howard Street and The Embarcadero).

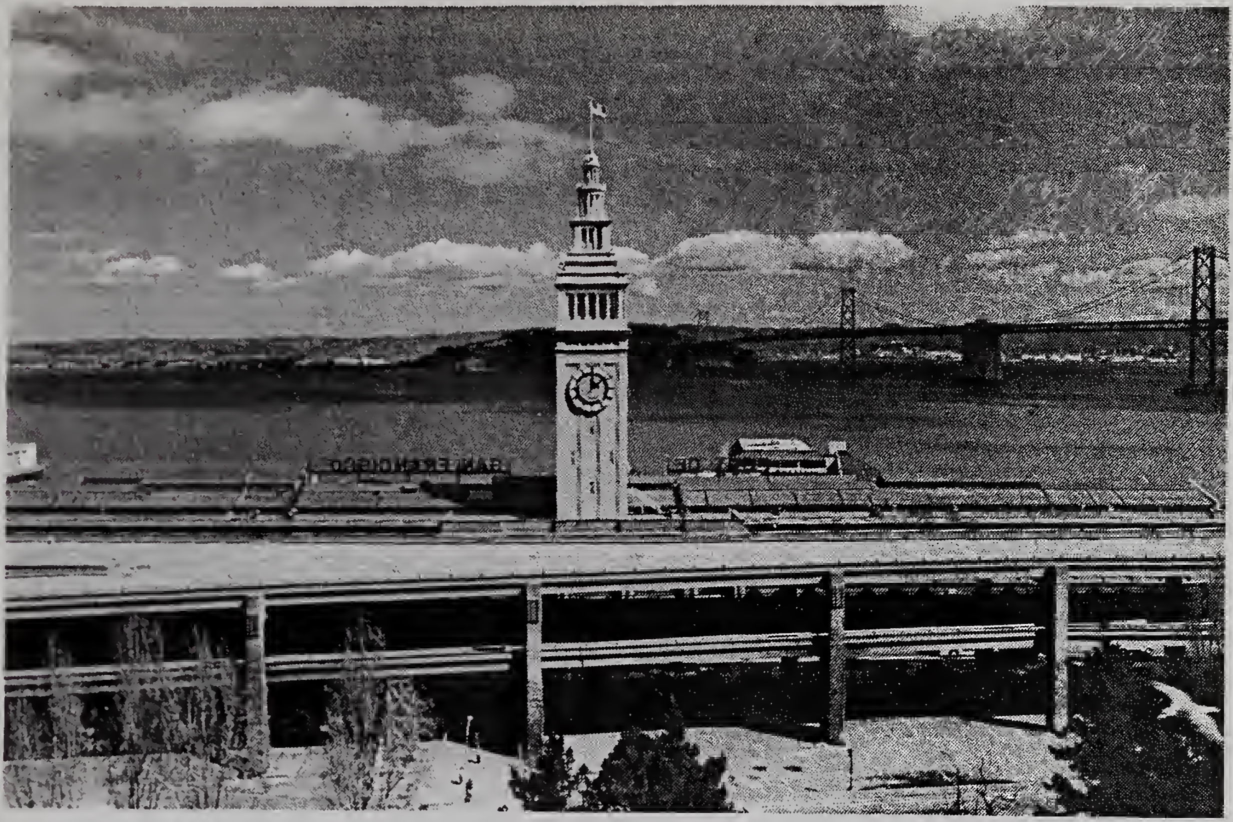
To the south of I-80, land uses in the South Beach area, on either side of Second Street, include a mix of renovated warehouses containing office and residential uses, and light industrial uses (printing, auto repair, etc.). Located between Third and Second Streets, is the historic South Park, a public park. Also south of I-80 are a number of recent residential developments, including Bayside Village (868 apartment units), the South Beach Marina Apartments (414 apartment units), and the Portside (62 condominium units), and the Delancey Street Foundation residential drug rehabilitation center.

3.2 VISUAL QUALITY, URBAN DESIGN, LIGHT AND GLARE

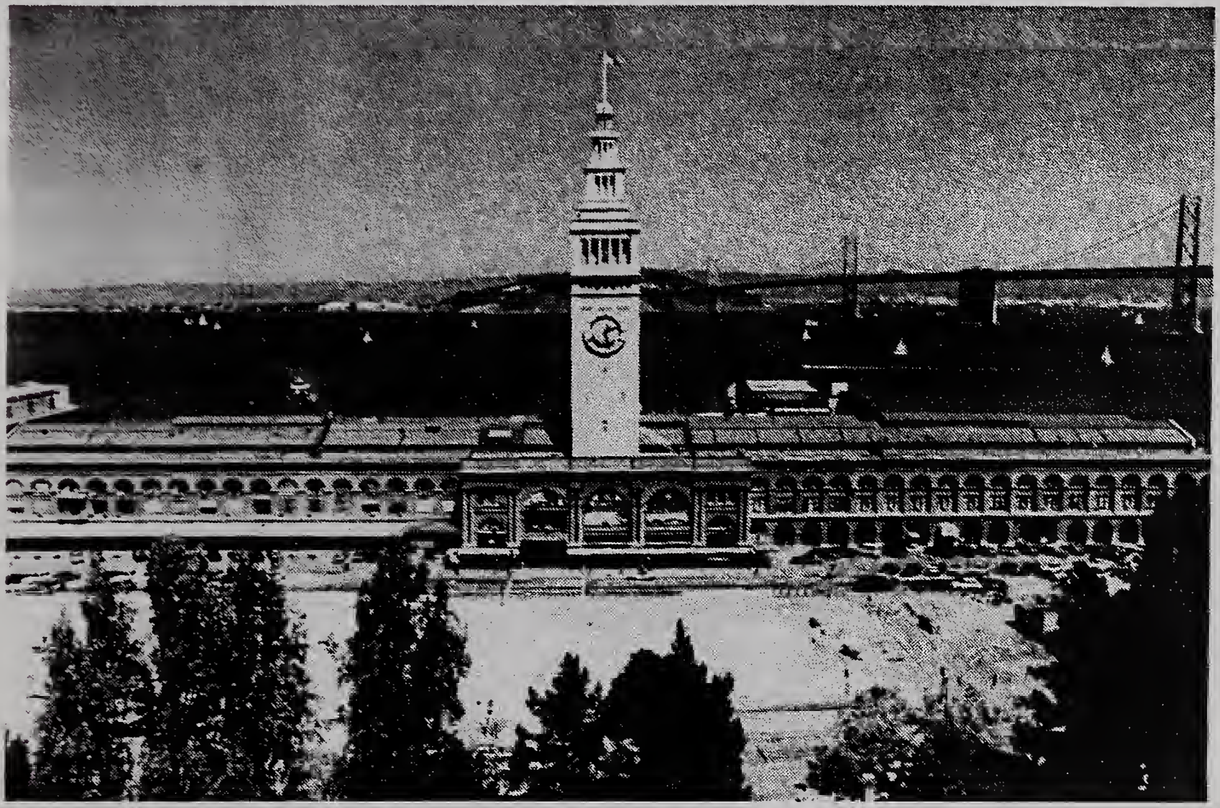
3.2.1 VISUAL QUALITY AND URBAN DESIGN

Prior to the 1989 earthquake, the visual and urban design environment of the downtown area was dominated by elevated, double-decked freeway structures, fly-overs, on-ramps and off-ramps. For pedestrians and motorists in the Mid-Embarcadero corridor, and for those who had views to the corridor from adjacent neighborhoods, the Embarcadero elevated freeway visually and physically defined the eastern boundary of downtown San Francisco. Views experienced by pedestrian and at-grade motorists were limited and obstructed by the elevated structures. For motorists on the elevated freeway, the northbound lower deck provided limited views to the City and the Bay; the southbound upper deck provided broad views in all directions. For users of surrounding buildings, the freeway was the dominant element in the foreground of views of the waterfront, the Bay and beyond. For pedestrian and vehicular users of adjacent streets, the elevated freeway obscured views of the waterfront. From Market Street, for example, the elevated freeway obscured views of the Ferry Building, leaving only the clock tower visible. (See Figure 3.2-1.) Views along Broadway and Washington Street looking east toward the Embarcadero corridor and the Bay were similarly obstructed by the elevated ramps leading to the freeway. Views of the City from the waterfront were also limited and obstructed by the elevated structure.

For pedestrian users of the Davis Street pedestrian walkway and adjacent sidewalks, the combination of the on- and off-ramps, the elevated freeway to the east, and high-rise buildings to the north, south, and west, created an urban open space "island" with confined views. For motorists traveling at-grade along Clay and Washington Streets, views into the Davis Street right-of-way urban open space were limited. Easterly views along Clay Street were dominated by the on-ramp and elevated freeway. For pedestrian and at-grade vehicular users along



Source: Darius Aldala Photography



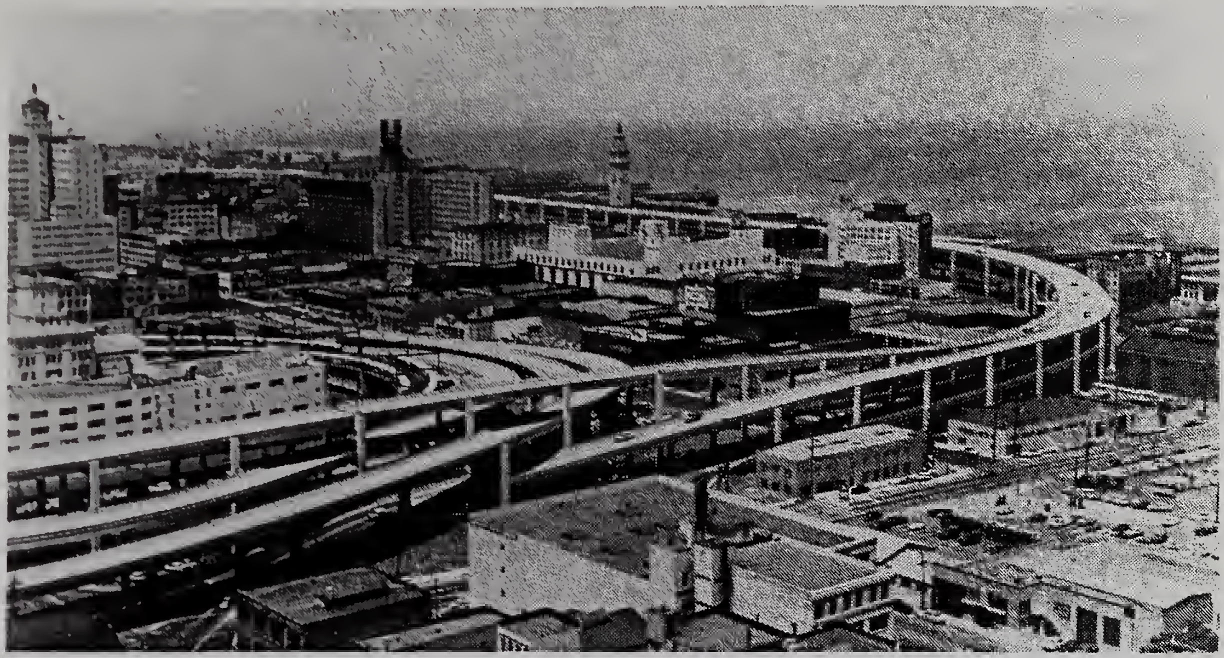
Source: Darius Aldala Photography

92.202E & 94.060E ALTERNATIVES TO REPLACEMENT OF THE EMBARCADERO FREEWAY AND THE TERMINAL SEPARATOR STRUCTURE	LOOKING EAST FROM THE 16TH FLOOR OF THE HYATT REGENCY TOWARDS THE FERRY BUILDING & BAY: PRE-DEMOLITION (TOP); EXISTING (BOTTOM)	Figure 3.2–1

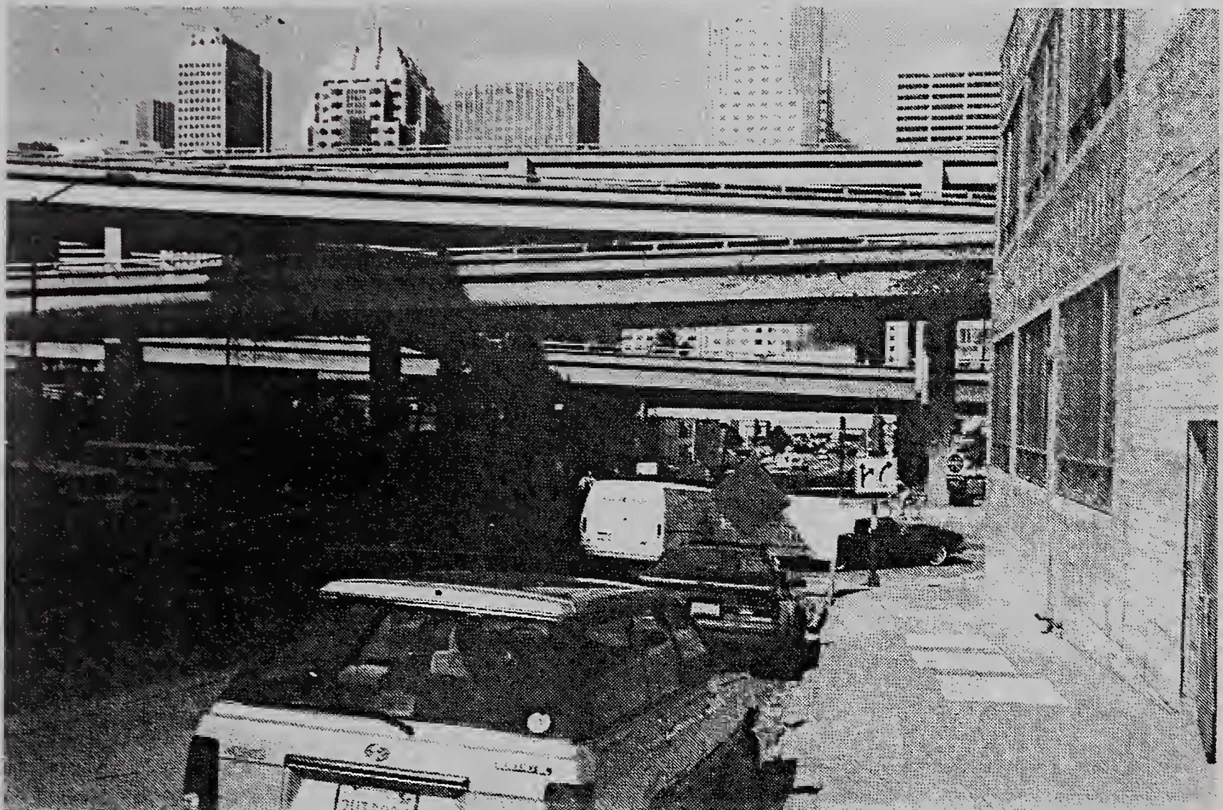
Drumm Street, views were dominated by the on- and off-ramps overhead and the elevated freeway to the east. In the study area south of Market Street, the pre-earthquake environment was dominated by the massive double-decked Terminal Separator Structure, including on- and off-ramps, support columns, and embankments (see Figure 3.2-2). Motorists on the top deck of the TSS had broad short and long range views of the City and the Bay. Motorists on the lower deck had limited views that were dominated by freeway structures. For pedestrians, north-south views were blocked by the TSS. East-west views were blocked by the TSS where it connected to I-80, crossing over Folsom and Harrison Streets between First and Second Streets. Just as under current conditions, the Fremont Street off-ramp near Folsom Street touched down mid-block, just north of the TSS, and just south of the Transbay Terminal elevated ramps. For pedestrian and at-grade motorists along Fremont and Folsom Streets, views were dominated by the massive elevated TSS.

The only major visual change in the area since the 1989 earthquake has been the demolition of the damaged Embarcadero Freeway and the TSS. Views within and through the Mid-Embarcadero area are less restricted. For pedestrian and motorists on the Mid-Embarcadero, the eastern boundary of the San Francisco waterfront is now visually and physically defined by waterfront development and the Promenade. Views toward the San Francisco Bay, the Bay Bridge, and hills of San Francisco and the East Bay are no longer limited by the elevated structures. For users of surrounding buildings, the freeway is no longer the dominant element in the foreground of views of the waterfront, the Bay and beyond. For pedestrians and motorists on adjacent streets, views of the waterfront and the Ferry Building landmark are less obscured. From the waterfront buildings, piers and open spaces, views to the City (Justin Herman Plaza, the Embarcadero Center, the Financial District) are also less obstructed.

In the area south of Market Street, the environment is no longer dominated by the massive double-decked Terminal Separator Structure. For vehicular users, the broad short and long range views of the City and the Bay from the elevated structure are no longer available. For pedestrians, north-south views are much more open although the elevated I-80/U.S. 101 is still a prominent feature. The Fremont Street off-ramp, between Howard and Folsom Streets, is no longer surrounded by the massive TSS and the only remaining elevated freeway structure is the Transbay Terminal ramp to the north. For motorists on the off-ramp and pedestrians and motorists on Fremont and Folsom Streets, views are now defined primarily by mid- to high-rise buildings to the west, north and south, and by low-rise buildings and a rise in grade to the south.



Source: California Department of Transportation, circa 1954



Source: California Department of Transportation

92.202E & 94.060E ALTERNATIVES TO REPLACEMENT OF THE EMBARCADERO FREEWAY AND THE TERMINAL SEPARATOR STRUCTURE	OBLIQUE VIEW OF THE TSS AND FREEWAY (TOP) LOOKING NORTHWEST ON FREMONT ST. PRE-DEMOLITION (BOTTOM)	Figure 3.2–2

The Fremont/Harrison Streets off-ramp, the Essex/First Streets on-ramps and the Sterling Street on-ramp remain as they were prior to the earthquake but without the TSS. The only other remaining elevated structure in their vicinity is the I-80/U.S. 101 freeway. The TSS no longer forms a massive overhead "ceiling," and a north-to-south, diagonal swath of land has been vacated by the demolition. For pedestrians and motorists users, most views are still relatively confined by the remaining freeway structures and surrounding buildings. Views east and west along Folsom Street are one notable exception, and pedestrians and motorists currently have long uninterrupted views.

3.2.2 LIGHT AND GLARE

Prior to the earthquake, the primary source of light and glare in the study area was from vehicle headlights during early morning and evening hours. Vehicle headlights on the elevated freeway shone on upper story levels of adjacent buildings. Below the freeway, the primary source of light and glare was from the headlights of vehicles using, departing or approaching the freeway, and from the headlights of vehicles using surface streets. Secondary sources of light and glare included lighting on the elevated freeway, surface streets and for pedestrians.

Presently, the primary source of light and glare in the study area is from the headlights of vehicles using surface streets during morning and evening hours. Surface street and pedestrian lighting continues to provide a secondary source of light and glare.

3.3 TRANSPORTATION

Transportation conditions in the vicinity of the project are defined by automobile traffic, a variety of transit services, on- and off-street parking facilities, goods movement, bicycles, and pedestrian activity. Unless otherwise stated, the descriptions of these issues under existing and pre-earthquake conditions which follow, as well as the analyses of alternatives presented in Section 4: Environmental Consequences and Mitigation Measures, assume " normal" peak hour operating conditions, when transportation activity in the downtown and vicinity is at its busiest, but when no special " incident" such as an accident, stall, or unusually high traffic volumes on a critical route cause a breakdown in the system. The City's Department of Parking and Traffic estimates that " normal" conditions occur about 66 to 70 percent of all weekday evening peak commute periods, and more often in morning commute periods. (Additional information and analysis of " incident" conditions, estimated to occur about 25 to 30 percent of the time in weekday evening commute periods[4], are presented on pp. 272-278.)

3.3.1 TRAFFIC

Two study areas (Figure 3.3-1) have been defined for the traffic analysis: a primary and a secondary study area. The primary study area is bounded by Broadway to the north, Sansome/Market/Sixth Streets to the west, Brannan Street to the south, and the San Francisco Bay to the east. This area is the primary focus of the traffic evaluation for the various alternatives. The secondary study area includes sixteen additional intersections north, west, and south of the primary study area; generally, its western boundary is Sixth Street/Taylor Street, the southern boundary is King Street, and the northern boundary is Broadway. In response to comments received in the scoping process, this section also presents information regarding pre-earthquake and existing traffic volumes on Broadway, Stockton, Bay, Leavenworth, and Seventh Streets, some of which lie outside the primary and secondary study areas.

Traffic operating conditions for surface streets in the primary and secondary study areas are described using overall network statistics for the primary study area, Level of Service (LOS) designations for primary and secondary study area intersections, travel speeds for selected roadway segments, and the length of vehicle queues for selected intersection approaches in the primary study area. The ease of access to and from the freeway ramps is related to the congestion on surface streets approaching the on-ramps, on streets receiving off-ramp traffic and on the balance between demand and capacity of the ramps themselves. A number of summary statistics are used to describe freeway operating conditions.

The overall network statistics indicate the level of congestion and delay which occur in the primary study area under existing conditions and prior to the earthquake. LOS designations are a qualitative description of an intersection's performance based on traffic delays. An intersection's LOS could range from A, representing free-flow conditions, to F, representing jammed conditions (see Appendix C for a detailed description of the various LOS operating conditions). Travel speeds have been calculated using a traffic simulation model for the primary

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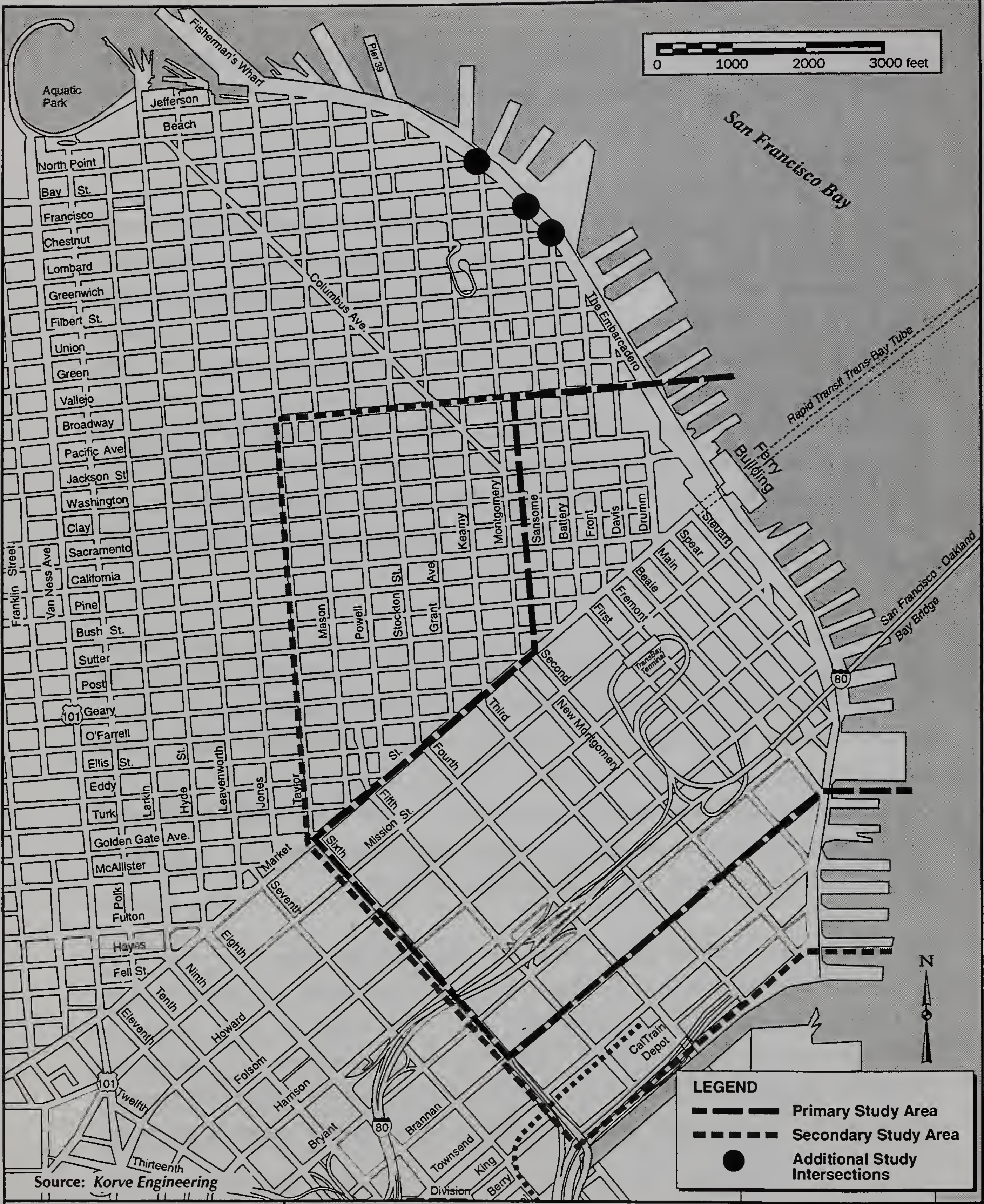
[4] San Francisco Department of Parking and Traffic, April 6, 1993 memo to file from Jack Fleck, "PM Peak Traffic Patterns Approaching Bay Bridge."



Source: *Korve Engineering*

92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

PROJECT
STUDY AREAS

Figure 3.3-1

would be expected for that segment throughout the peak hour. Maximum vehicle queues by lane have been also calculated, and serve as an indication of the maximum number of vehicles per lane that would be stopped on the link[5], either due to a red signal or to congestion. The ramp system balance analysis is based on the relationship between the total ramp capacity provided and the total vehicle demand estimated to utilize that capacity. Freeway operating conditions for 1993/1994 conditions were calculated using the FREQ11 software program, a freeway corridor simulation model. Traffic operating conditions on the Embarcadero Freeway were not calculated for pre-earthquake conditions, but are discussed qualitatively.

Street Network

The primary study area has a well developed street system between Broadway and Bryant Street, and is generally the same as under pre-earthquake conditions. The exception is Steuart Street which was two-way between Harrison Street and Mission Street prior to the earthquake and was revised to one-way southbound following the earthquake to ease traffic flow. Beneath the freeway, the Embarcadero roadway between Harrison Street and Broadway was unsignalized prior to the earthquake, except for the pedestrian crossing at the foot of Market Street. Under 1993 conditions traffic signals on The Embarcadero were operational at Howard Street, Mission Street, Washington Street and Broadway.

In the north of Market area, major streets are generally one-way, except for California Street, Drumm Street between Market and Jackson Street, and Broadway. The major arteries generally contain two traffic lanes with parking and primarily serve the local downtown uses. The exceptions are Sansome Street and Battery Street. Sansome Street is a high capacity northbound arterial, and prior to the earthquake it was the primary route to the Broadway on-ramp to the Embarcadero Freeway. Battery Street is a southbound arterial that formerly acted as a main distributor street for the Broadway off-ramp from the Embarcadero Freeway and is currently the primary route to the First Street on-ramp. The blocks of the street grid system in the north of Market area are generally 183 meters (600 feet) in length.

In the South-of-Market area, streets are primarily one-way, and blocks are between 130 to 244 meters (425 to 800 feet) by 183 meters (600 feet). Main Street, Fremont Street and Third Street are the primary northbound arteries, while Spear Street, Beale Street, First Street and Fourth

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[5] In this context, "link" is defined as any roadway segment between two intersections.

Street are the primary southbound arteries. These streets serve as the major access roadways between the I-80 ramps (Fremont Street, First Street, Essex Street and Fourth Street) and the downtown area. Most streets contain three to four lanes. The two-way (two lanes in each direction) east-west streets include Market Street, Mission Street, and Brannan Street. Fifth Street and Sixth Street are both two-way north-south arteries, providing two to three travel lanes in each direction respectively. Sixth Street forms the western boundary of the primary study area and provides access to and from the I-280 freeway. Howard Street, Harrison Street, and Bryant Street are primarily one-way streets, with block lengths of 274 meters (900 feet) or greater. Howard Street provides five westbound travel lanes and is one of the primary routes to the I-80/U.S. 101 southbound on-ramp at Fourth Street. Folsom Street is a major eastbound street accessing the downtown and I-80 freeway ramps, especially those at Essex Street and First Street. Harrison Street is a one-way arterial from Third Street westward, which also serves as a primary travel route to the Fourth Street I-80/U.S. 101 southbound on-ramp. Harrison Street also provides five westbound travel lanes in the expanded study area.

Bryant Street is an eastbound arterial that provides access to the Fifth Street I-80/Bay Bridge eastbound on-ramp. It is also the primary route for vehicles exiting the northbound U.S. 101 off-ramp at Fourth Street, going into the study area. Folsom Street is currently a four lane eastbound street except from The Embarcadero to Main Street it becomes a two-way street, with three lanes eastbound and one lane westbound.

Mission Street is a transit-oriented arterial, having one of the two lanes in the westbound direction, between Main Street and Third Street (7 AM to 6 PM, weekdays) and between Fourth and Eleventh Streets (4 PM to 6 PM, weekdays), dedicated as a bus lane. In the eastbound direction, Mission Street has a dedicated transit lane between Eleventh Street and Fifth Street (7 AM to 9 AM and 4 PM to 6 PM, weekdays), and between Third Street and Beale Street (7 AM to 6 PM, weekdays). Market Street has two lanes in each direction, and serves as a transit oriented arterial, with bus stops on center islands and at the curb. The left curb lanes on First Street (between Market Street and Howard Street) and on Fremont Street (between Mission Street and Market Street), are also exclusive transit lanes.

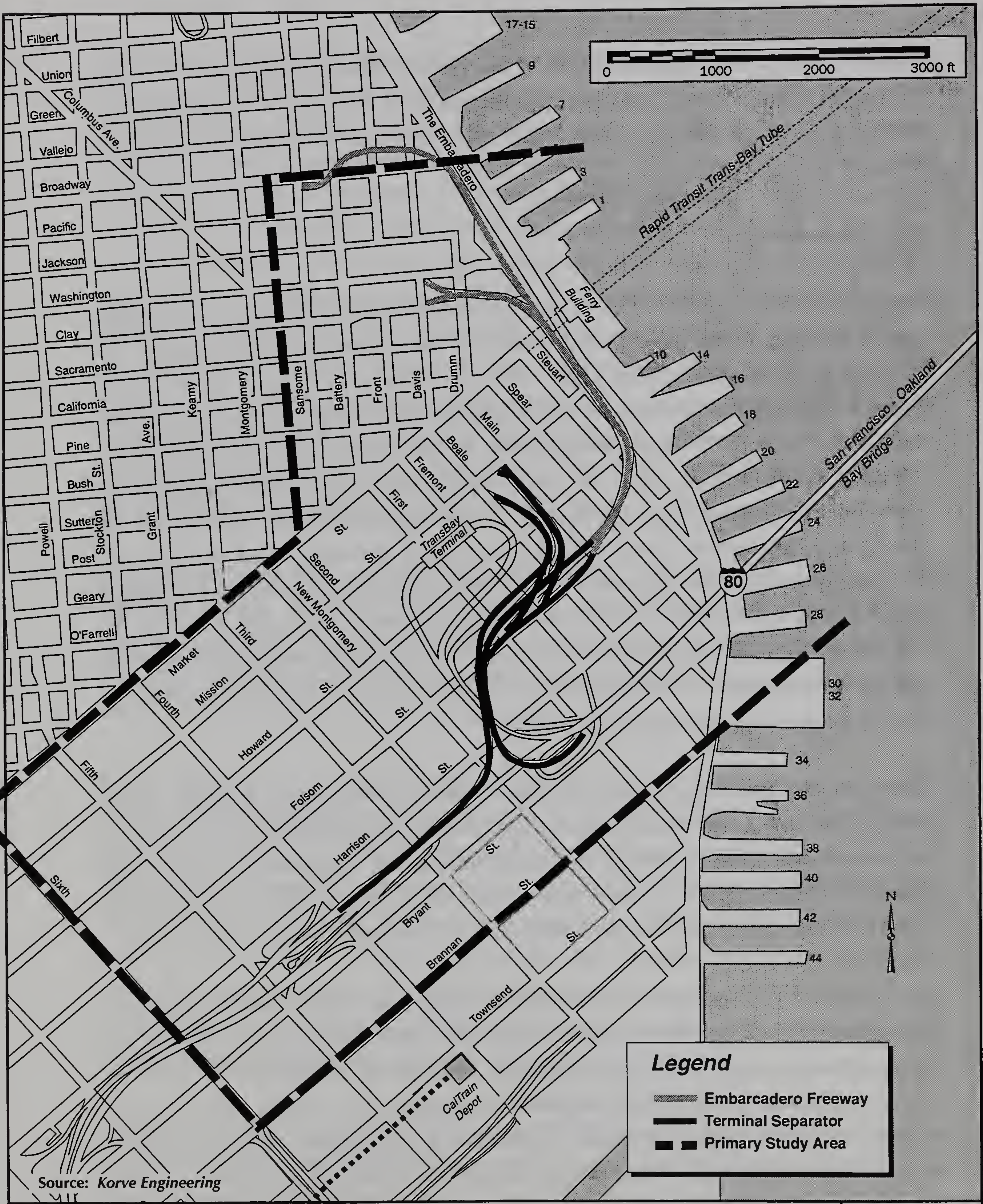
The base year (1993) configuration of the Embarcadero roadway along the eastern edge of the study area contains three continuous lanes in each direction between Broadway and Howard Street. Between Howard Street and Folsom Street The Embarcadero has two continuous lanes in the southbound direction and three in the northbound direction. There are two continuous lanes in each direction between Folsom Street and Harrison Street to conform with the South-Embarcadero section. There is no direct vehicular connection between The Embarcadero and Market Street, so vehicles use Steuart Street and Mission Street for access to/from The Embarcadero.

Freeway Network

Prior to the closure and demolition of the Embarcadero Freeway (SR 480), the Terminal Separator Structure connected U.S. 101/I-80 with the Main Street/Beale Street ramps and the Embarcadero Freeway (see Figure 3.3-2). The Main Street off-ramp touched down at the intersection of Mission and Main Streets, and provided access to Mission Street westbound and Main Street northbound. The Beale Street on-ramp touched down at the intersection of Mission and Beale Streets, with access to this ramp available from Mission Street eastbound and westbound and from Beale Street southbound. The Embarcadero Freeway continued from the Main Street/Beale Street split towards the Bay, and north to Broadway. A set of on- and off-ramps were provided at Clay Street/Washington Street, and at the intersections of Broadway at Sansome Street and Broadway at Battery Street. Drivers destined for locations north on The Embarcadero were required to exit at Broadway, and continue northbound on Sansome Street, towards The Embarcadero. Southbound drivers would use Battery Street to the Clay Street on-ramp, or use the Sansome Street/Broadway on-ramp.

Additional ramps connecting to the Embarcadero Freeway were provided at Folsom Street, including an off-ramp from The Embarcadero southbound at the intersection of Fremont Street and Folsom Streets, and an on-ramp northbound towards the Embarcadero Freeway at the intersection of Beale Street and Folsom Street. These ramps allowed local north-south trips to be made via the Embarcadero Freeway between Folsom Street and Broadway, and vice versa.

Under existing conditions (Figure 3.3-1), the primary study area contains three off-ramps from the Bay Bridge: at Fremont Street between Folsom Street and Howard Street, at Fremont and Harrison Streets and at Fifth and Harrison Streets. There are four I-80/Bay Bridge eastbound on-ramps. Two are located on Harrison Street, at First Street and at Essex Street, while the other two are located on Bryant Street at Fifth Street and at Sterling Street. Access to and from the Peninsula using the I-80 freeway is made via on- and off-ramps at Fourth Street, located between Harrison and Bryant Streets.



Source: *Korve Engineering*

92.202E & 94.060E
Alternatives to Replacement of The Embarcadero Freeway & Terminal Separator Structure

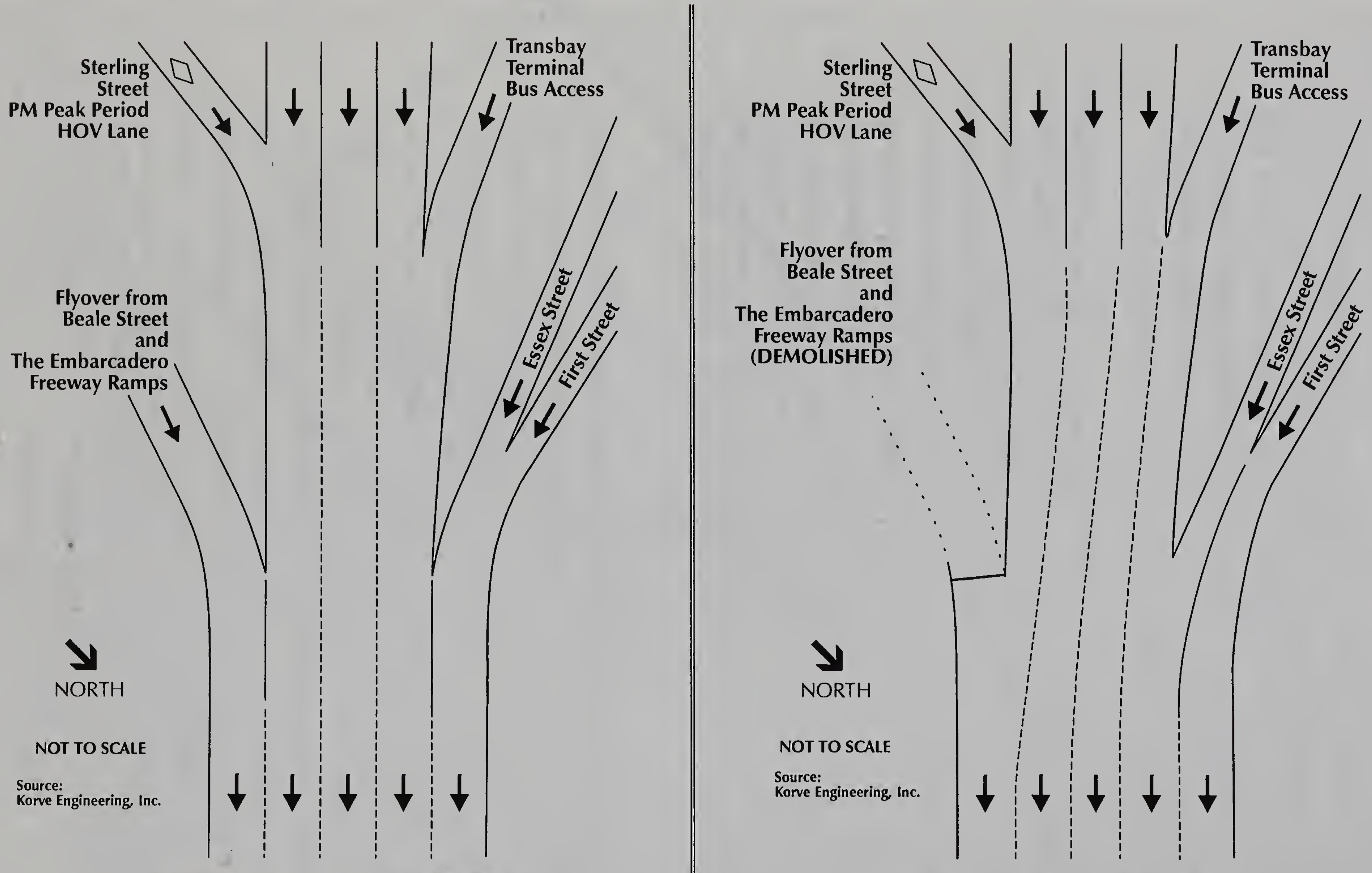
PRE-EARTHQUAKE STUDY AREA NETWORK

Figure 3.3-2

Interstate 280, located south of the Bay Bridge/I-80, connects to areas south of San Francisco. The freeway was closed following the October 17, 1989 earthquake, and was partially re-opened to one lane each direction in April 1993. In the summer of 1994 the lower deck (eastbound direction) was re-opened. The full re-opening of I-280 in 1995 is projected to somewhat relieve existing AM and PM peak period congestion for those ramps connecting with I-80/U.S. 101 at Fourth Street, by reducing South Bay traffic currently using U.S. 101 to I-280.

The freeway lane configurations that existed on the lower deck of the Bay Bridge during pre-earthquake conditions were re-striped by Caltrans following the closure of the Embarcadero Freeway and the Terminal Separator ramps. Part A of Figure 3.3-3 presents a schematic representation of the lane configurations that existed during pre-earthquake conditions at the eastbound I-80 on-ramp connections, when the fly-over on-ramp entered with its own lane on the bridge and vehicles were not required to merge with mainline traffic. This ramp served as a high-capacity on-ramp to I-80 eastbound and was shared by both the Beale Street and the Embarcadero Freeway on-ramps. During pre-earthquake conditions, the ramps from Harrison Street at First Street and Essex Street were required to merge prior to entering their own lane on I-80 eastbound. This condition restricted the volume that was able to be processed at this location. Buses from the Transbay Terminal access roadway were required to merge with mainline traffic.

Following the closure of the Main/Beale and The Embarcadero ramps, the fly-over ramp was closed, and the Harrison Street on-ramp merges were re-striped. Part B of Figure 3.3-3 presents the lane geometry at the lower deck of the Bay Bridge as it exists today. After the closure of the fly-over on-ramp, Caltrans re-striped the Bridge to provide additional capacity for the First Street and Essex Street on-ramps. Buses from Transbay Terminal access I-80 eastbound in their own lane, merging downstream with Essex Street traffic. The First Street on-ramp traffic enters the Bridge as a lane-add. This revised geometry enables a more efficient processing and higher volume of vehicles at the First Street on-ramp than existed during pre-earthquake conditions. In the opposite direction, the existing ramp connection to I-80/U.S. 101 to the south is also different from pre-earthquake conditions, as a result of the closure and subsequent demolition of the Terminal Separator Structure (TSS). Under pre-earthquake conditions, vehicles on the Beale Street on-ramp and The Embarcadero on-ramps, traveling toward U.S. 101 were required to first merge into one lane on the connecting ramp, and then merge with I-80 westbound. This resulted in a forced merge with mainline traffic as vehicles waited for available gaps in the heavy peak hour mainline traffic. Similarly, vehicles entering I-


Sterling Street PM Peak Period HOV Lane
Transbay Terminal Bus Access
Flyover from Beale Street and The Embarcadero Freeway Ramps
Essex Street
First Street
NORTH
NOT TO SCALE
Source: Korve Engineering, Inc.
Sterling Street PM Peak Period HOV Lane
Transbay Terminal Bus Access
Flyover from Beale Street and The Embarcadero Freeway Ramps (DEMOLISHED)
Essex Street
First Street
NORTH
NOT TO SCALE
Source: Korve Engineering, Inc.

A. Pre-Earthquake Striping Plan

B. Existing Striping Plan

92.202E & 94.060E Alternatives to Replacement of The Embarcadero Freeway & TSS	BAY BRIDGE ACCESS CONFIGURATION (I-80 Eastbound)	Figure 3.3-3

80 westbound via the Fourth Street on-ramp were also forced to merge and weave with mainline traffic and vehicles exiting at the Eighth Street off-ramp. Following the earthquake, the TSS on-ramp was closed and the Fourth Street on-ramp was re-striped and reconfigured as a lane-add, increasing the on-ramp capacity and making the weaving operation more efficient.

Existing and Pre-Earthquake Traffic Conditions

Changes in the street and freeway network as a result of the earthquake have affected the volume of automobile traffic in the vicinity of the proposed project, as well as travel time, speed and congestion. The primary and secondary study areas, where the proposed project alternatives have the potential to change existing traffic conditions, are the focus of this analysis, and pre-earthquake and existing traffic conditions in those areas are described below. Traffic outside the study areas have also changed since the earthquake, and generally reflect a redistribution of vehicle trips that were formerly made via the Embarcadero Freeway and/or the TSS. For example, the amount of cars using Seventh Street in the peak commute hours increased dramatically after the earthquake, such that traffic volumes at the intersection of Seventh and Howard Streets increased about 106 percent in the AM peak hour, and about 117 percent in the PM peak hour. In other areas, such as the Broadway corridor, the amount of cars declined, such that traffic volumes at the Broadway/Sansome, Broadway/Battery, Broadway/Columbus, Broadway/Stockton, and Broadway/Powell intersections declined between about 12 and 35 percent in the peak evening commute hour after the earthquake.[6]

Street Network Statistics

Table 3.3-1 presents the network-wide statistics for the primary study area for the AM and PM peak hours under pre-earthquake and existing conditions. The table shows less vehicles entering and exiting surface streets in the study area during the AM and PM peak hour under 1993 existing conditions (18% and 16% respectively) as compared to pre-earthquake conditions. The decrease is most likely explained by the fact that some pre-earthquake drivers

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[6] San Francisco Department of Parking and Traffic, "Report on Traffic Conditions in the Chinatown, North Beach, and Fisherman's Wharf District Before and After the 1989 Loma Prieta Earthquake", October 28, 1994. A copy of this report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco. In addition to the intersections cited here, the report compares pre-earthquake and existing traffic volumes at the following intersections: Stockton/Clay, Stockton/Sacramento, Bay/Embarcadero, Bay/Columbus, Bay/Van Ness, Seventh/Bryant, Leavenworth/Bush, and Leavenworth/Golden Gate.

TABLE 3.3-1
SURFACE STREET NETWORK-WIDE PEAK HOUR STATISTICS
PRIMARY STUDY AREA

Measure of Effectiveness	**Pre-Quake**		**1993 Existing**	
	AM	**PM**	**AM**	**PM**
Vehicles Entering & Exiting	54,870	59,720	45,110	50,330
Vehicle - Miles Traveled	33,920	37,420	35,590	40,230
Vehicle - Hours Traveled	2,390	3,730	2,310	2,890
Moving Time/Travel Time	0.7	0.6	0.7	0.7
Average Speed (mph)	14	10	15	14

Source: Korve Engineering, Inc.

have found alternative routes to their destinations which no longer take them through the study area. Some shift to transit ridership also occurred after the earthquake, when transit provided a reliable alternative form of transportation to and from downtown San Francisco.

Vehicle miles of travel on surface streets during the peaks are higher under existing conditions than for pre-earthquake. The increase is due to the absence of the Embarcadero Freeway, which kept a relatively large amount of vehicles off the street (approximately 6,600 in the AM peak hour and 5,100 in the PM). The number of vehicle-hours traveled (VHT) on surface streets during the AM peak hour is approximately the same under existing and pre-earthquake conditions. The VHT on surface streets during the PM peak hour are 30% lower under existing conditions than before the earthquake, due to the decrease in overall travel volumes, as explained in the first paragraph above.

The moving time vs. travel time ratio on surface streets for both AM and PM peak hours is slightly higher (better) under existing conditions than it was before the Loma Prieta Earthquake. The average speed on surface streets is also slightly higher (better) under existing conditions. Again, these improvements are due to the overall decrease in travel volumes, which contributed to pre-earthquake congestion around the Embarcadero Freeway and the TSS on-ramps.

Intersection Level of Service

Table 3.3-2 presents the levels-of-service for pre-earthquake and existing (year 1993) conditions in the AM and PM peak hours for 71 intersections in the primary study area. The LOS worsened between pre-earthquake and existing conditions at 19 intersections during the AM peak hour, and at 14 intersections during the PM peak hour. However, the LOS improved between pre-earthquake and existing conditions at 14 intersections during the AM peak hour, and at 18 intersections during the PM peak hour. In general, the data reflects shifts in areas of congestion from the approaches to/from the Embarcadero Freeway and the TSS under pre-earthquake conditions, to the approaches to/from the remaining freeway on- and off-ramps under existing conditions.

Two intersections degraded from an acceptable LOS prior to the earthquake to LOS E or F under existing (1993) conditions: Battery/Bush (AM and PM peak hours) and Folsom/Steuart (PM peak hour). A higher volume of vehicles accesses the I-80 freeway from Battery and First Streets under existing conditions than used to prior to the earthquake. As a result, the intersection of Bush Street at Battery Street has degraded from LOS D to LOS E under existing conditions for the AM peak hour. Likewise, at the intersection of Folsom and Steuart Streets, the LOS was A under pre-earthquake conditions, and decreased to LOS F under 1993 conditions. Vehicles waiting to access The Embarcadero northbound at Folsom Street required a gap in the Embarcadero roadway traffic stream, thereby creating a queue of vehicles on Folsom Street extending to the intersection of Folsom and Steuart Streets. The intersection of Folsom Street and Steuart Street/The Embarcadero is now signalized, and appears to be operating at an acceptable level of service.

In contrast to the above examples, congestion since the earthquake has improved from LOS E or F to an acceptable LOS at eight intersections: Mission/Main, Market/Main, Harrison/Essex, Harrison/First, Second/Brannan, Second/Bryant, Second/Harrison and Sansome/Pacific. During the AM peak hour, the intersections of Main Street at Mission Street and at Market Street, operated at LOS E under pre-earthquake conditions due to the presence of the Main Street off-ramp, which contributed to high traffic volumes on the Main Street/Drumm Street corridor; with the closure of the off-ramp, the existing LOS at those intersections improved to B and C respectively. During the PM peak hour, under pre-earthquake conditions, the intersections of Harrison/First Street and Harrison/Essex experienced significant delays (LOS E) due to the pre-earthquake lane configuration on I-80 eastbound; under existing PM peak hour conditions,

TABLE 3.3-2
INTERSECTION PEAK HOUR LOS SUMMARY
PRIMARY STUDY AREA

INTERSECTION	PRE-EARTHQUAKE		1993 EXISTING	
	AM	PM	AM	PM
Harrison St & First St	B	F	A	B
Harrison St & Fremont St	B	B	B	A
Harrison St & Main St	A*	A*	B	B
Harrison St & Spear St	A*	A*	A*	B*
Harrison St. & Essex St.	B	E	A	C
Folsom St & First St	B	B	A	B
Folsom St & Fremont St	C	B	C	B
Folsom St & Beale St	A	A	A	A
Folsom St & Main St	B*	A*	B	B
Folsom St & Spear St	A*	A*	A*	A*
Folsom St & Steuart St	A*	A*	F*	A*
Howard St & First St	B	B	B	B
Howard St & Fremont St	B	B	B	B
Howard St & Beale St	B	B	B	A
Howard St & Main St	B	B	B	B
Howard St & Spear St	A*	A*	A*	A*
Howard St & Steuart St	A*	A*	B	B
Mission St & First St	B	B	B	B
Mission St & Fremont St	B	B	B	B
Mission St & Beale St	B	B	B	B
Mission St & Main St	E	B	B	B
Mission St & Spear St	B	B	B	B
Mission St & Steuart St	A*	A*	B	B
Market St & Sansome St	A	A	A	A
Market St & Battery St	C	C	B	B
Market St & Fremont St	C	B	B	B
Market St & Beale St	B	C	B	B
Market St & Main St	E	F	C	B
Sansome St & Bush St	B	B	B	B
Sansome St & Pine St	B	B	B	B
Sansome St & California St	B	B	B	B
Sansome St & Sacramento St	B	B	B	B
Sansome St & Clay St	B	B	B	B
Sansome St & Washington St	A	B	B	A

* Unsignalized intersection. Minor approach Level of Service. Source: Korve Engineering, Inc.

CONTINUED...

TABLE 3.3-2 (Continued)
INTERSECTION PEAK HOUR LOS SUMMARY
PRIMARY STUDY AREA

INTERSECTION	PRE-EARTHQUAKE		1993 EXISTING	
	AM	PM	AM	PM
Sansome St & Jackson St	B	B	A	A
Sansome St & Pacific Ave	B	E	A	A
Sansome St & Broadway	D	C	B	B
Battery St & Bush St	D	E	E	F
Battery St & Pine St	B	A	B	B
Battery St & California St	B	B	B	B
Battery St & Sacramento St	B	B	B	B
Battery St & Clay St	B	B	B	B
Battery St & Washington St	B	B	A	B
Battery St & Jackson St	B	C	A	A
Battery St & Pacific Ave	A	B	A	B
Battery St & Broadway	C	C	B	B
Front St & Pine St	B	B	A	A
Front St & California St	A	B	B	B
Front St & Sacramento St	A	B	B	B
Front St & Clay St	A	A	B	B
Front St & Broadway	A*	A*	A*	B*
Davis St & California St	A	B	B	B
Davis St & Sacramento St	B	B	A	B
Davis St & Broadway	A*	A*	A*	A*
Drumm St & California St	B	B	B	B
Drumm St & Sacramento St	A	B	A	B
Drumm St & Clay St	A*	B*	B	B
Drumm St & Washington St	A*	A*	B	B
Second St & Brannan St	C	F	C	C
Second St & Bryant St	B	F	B	D
Second St & Harrison St	B	F	B	D
Second St & Folsom St	B	B	B	C
Second St & Howard St	B	C	B	B
Second St & Mission St	B	B	B	B
Second St & Market St	A	A	A	A
The Embarcadero & Harrison St	A*	B*	B*	B*
The Embarcadero & Folsom St	A*	A*	C*	B*
The Embarcadero & Howard St	A	A	A	B

*Unsignalized intersection. Minor approach Level of Service. Source: Korve Engineering, Inc.

CONTINUED...

TABLE 3.3-2 (Continued)
INTERSECTION PEAK HOUR LOS SUMMARY
PRIMARY STUDY AREA

INTERSECTION	PRE-EARTHQUAKE		1993 EXISTING	
	AM	PM	AM	PM
The Embarcadero & Mission St	B	A	B	A
The Embarcadero & Washington St	A*	A*	B	A
The Embarcadero & Broadway	A*	A*	B	B
New Montgomery & Howard	B	B	A	B
New Montgomery & Mission	B	B	B	C
New Montgomery & Market	B	C	B	C
Third Street & Brannan	B	B	B	B
Third Street & Bryant	B	B	B	B
Third Street & Harrison	B	B	B	B
Third Street & Folsom	B	B	B	B
Third Street & Howard	B	B	B	B
Third Street & Mission	B	B	B	C
Third Street & Market	B	B	B	B
Fourth Street & Brannan	B	B	B	B
Fourth Street & Bryant	B	B	C	C
Fourth Street & Harrison	B	C	B	B
Fourth Street & Folsom	B	B	B	B
Fourth Street & Howard	B	B	B	B
Fourth Street & Mission	B	B	B	B
Fourth Street & Market	B	B	B	B
Fifth Street & Brannan	B	B	B	B
Fifth Street & Bryant	B	B	B	B
Fifth Street & Harrison	B	B	C	C
Fifth Street & Folsom	B	B	B	B
Fifth Street & Howard	B	B	B	B
Fifth Street & Mission	A	B	B	A
Fifth Street & Market	B	B	C	C
Sixth Street & Brannan	B	D	B	B
Sixth Street & Bryant	B	B	B	B
Sixth Street & Harrison	B	B	B	B
Sixth Street & Folsom	B	B	B	B
Sixth Street & Howard	B	E	B	B
Sixth Street & Mission	B	B	B	B
Sixth Street & Market	B	B	B	B

*Unsignalized intersection. Minor approach Level of Service. Source: Korve Engineering, Inc.

these intersections operate at LOS C. For the same reason, Second Street experienced unacceptable levels of congestion between Brannan Street and Harrison Street (LOS F) during the PM peak hour; under existing conditions the PM peak hour LOS at the same location is D or better. Under pre-earthquake conditions, higher volumes on Sansome Street associated with the Embarcadero Freeway on-ramp resulted in LOS E at Pacific Street during the PM peak hour; under existing PM peak hour conditions this intersection operates at LOS A.

Table 3.3-3 presents the pre-earthquake and existing LOS at 16 secondary study area intersections. The traffic volumes and operating conditions changed very little between pre-earthquake and existing conditions. Most intersections operated and continue to operate at acceptable LOS of B and C. Only the minor approach (Lombard Street) traffic at the unsignalized intersection of the Embarcadero roadway at Battery/Lombard Streets operates at unacceptable LOS (E and F during the peak hours), just as it did prior to the earthquake.

TABLE 3.3-3
INTERSECTION PEAK HOUR LOS SUMMARY
SECONDARY STUDY AREA

INTERSECTION	PRE-EARTHQUAKE		1993 EXISTING	
	AM	PM	AM	PM
The Embarcadero & Bay St	B	B	B	C
The Embarcadero & Sansome St	B	B	C	B
The Embarcadero & Battery/Lombard St	E*	F*	E*	F*
Broadway & Stockton St	B	B	C	B
Washington St & Montgomery St	B	C	B	B
California St & Kearny St	B	B	B	B
Post St & Stockton St	B	B	B	B
Townsend St & Fourth St	B	B	B	B
Townsend St & Third St	C	C	B	B
Pine St & Mason St	B	B	B	B
Bush St & Powell St	B	B	B	B
Sutter St & Grant St	B	B	B	B
O'Farrell St & Taylor St	B	B	B	B
Ellis St & C. Magnin St	B	B	B	B
O'Farrell St & Powell St	B	B	B	B
O'Farrell St & Stockton St	B	B	C	C

* Unsignalized intersection. Minor approach Level of Service.

Source: Korve Engineering, Inc.

Street Travel Speeds

Table 3.3-4 presents the average AM and PM peak hour travel speeds for pre-earthquake and existing conditions at key segments in the primary study area. Under pre-earthquake and existing conditions peak hour travel speeds on the streets in the primary study area ranged from 10 to 35 km/h (6 to 22 mph). Similar to intersection level of service, travel speed data generally reflects shifts in areas of congestion from the approaches to/from the Embarcadero Freeway and the TSS under pre-earthquake conditions, to the approaches to/from the remaining freeway on- and off-ramps under existing conditions.

During the AM peak hour, Main and Beale Streets, which provided pre-earthquake access to and from the Main and Beale Street ramps, average travel speeds have increased compared to pre-earthquake conditions. Alternately, existing travel speeds decreased from pre-earthquake conditions on Harrison Street eastbound, reflecting the existing use of Harrison Street as a route to The Embarcadero from the off-ramp at Fremont and Harrison Streets. On Broadway, both eastbound and westbound, travel speeds decreased from approximately 27 to 30 km/h (17 to 19 mph) under pre-earthquake conditions to 20 to 24 km/h (13 to 15 mph) under existing conditions. This reflects the higher volumes on Broadway, specifically east of Battery Street.

During the PM peak hour, travel speeds on Sansome Street increased from 10 km/h (6 mph) under pre-earthquake conditions to 19 km/h (12 mph) under existing conditions, primarily due to the elimination of the Sansome/Broadway on-ramp to the Embarcadero Freeway. As a result of signalization of several intersections on The Embarcadero between Harrison Street and Broadway (Howard Street, Mission Street, Washington Street and Broadway), average travel speeds increased during the AM peak hour by 8 km/h (5 mph) in the northbound direction and 11 km/h (7 mph) in the southbound direction. During the PM peak hour, travel speeds decreased slightly by 3 km/h (2 mph) in the northbound direction, while they increased by 19 km/h (12 mph) in the southbound direction.

Average travel speeds on Folsom Street remained almost unchanged between pre-earthquake and existing conditions. Only during the PM peak hour between First Street and The Embarcadero, travel speeds increased somewhat from pre-earthquake conditions by about 6 km/h (4 mph).

TABLE 3.3-4
PEAK HOUR AVERAGE TRAVEL SPEEDS (mph)
PRIMARY STUDY AREA

STREET SEGMENT	PRE-QUAKE		1993 EXISTING	
	AM	PM	AM	PM
Battery Street SB (Broadway - Market St)	9	9	8	9
Beale Street SB (Market St - Folsom St)	14	14	18	16
Broadway EB (Battery - The Embarcadero)	12	9	13	15
Broadway WB (The Embarcadero - Sansome St)	13	16	15	13
Bryant Street EB (Sixth St - Second St)	11	12	17	11
Bryant Street WB (The Embarcadero - Sterling St)	21	22	22	22
First Street SB (Market St - Harrison St)	11	4	17	12
Fifth Street NB (Brannan St - Market St)	16	14	11	12
Folsom Street EB (First St - The Embarcadero)	9	13	10	17
Folsom Street EB (Sixth St - Second St)	12	12	16	12
Fourth Street SB (Market St - Brannan St)	13	8	10	9
Fremont Street NB (Folsom St - Market St)	14	14	11	12
Harrison Street WB (The Embarcadero - Second St)	13	12	11	11
Harrison Street WB (Second St - Sixth St)	16	15	12	16
Howard Street WB (The Embarcadero - Second St)	16	13	11	12
Howard Street WB (Second St - Sixth St)	16	16	17	16
Main Street NB (Harrsion St - Market St)	7	14	14	15
Market Street EB (Second St - Main St)	11	4	11	10
Market Street WB (Main St - Second St)	9	9	11	9
Mission Street WB (The Embarcadero - Fremont St)	12	11	10	14
Sansome Street NB (Market St - Broadway)	9	8	12	12
Second Street SB (Market St - Brannan St)	16	16	17	16
Second Street NB (Brannan St - Market St)	14	2	16	6
Sixth Street SB (Market St - Brannan St)	16	11	16	13
The Embarcadero (Surface Roadway)NB (Harrsion St - Broadway)	16	22	20	22
The Embarcadero (Surface Roadway)SB (Broadway - Harrison St)	11	9	18	21
Third Street NB (Brannan St - Market St)	14	14	11	12

Note: Shaded cells indicate a 20% or greater change form pre-earthquake conditons

Source: Korve Engineering, Inc.

Intersection Approach Vehicle Queues

Table 3.3-5 presents a comparison of the maximum queue length per lane on The Embarcadero and on Harrison, First, Third, and Fourth Streets for pre-earthquake and existing conditions. A comparison of maximum queues on The Embarcadero indicates that overall queues have increased. These increases are due to the increased traffic volumes on The Embarcadero following the demolition of the Embarcadero Freeway, and the installation of traffic signals at Howard Street, Mission Street, Washington Street and at Broadway. Queues at the northbound approach to Bryant Street have decreased due to the closure of the I-280 freeway and the installation of a traffic signal.

Average queues on First Street and Harrison Street have increased from pre-earthquake to existing conditions, especially during the PM peak hour, since they represent the main access routes toward the I-80 eastbound freeway. In contrast, queues in the vicinity of the Harrison Street/First Street intersection have decreased somewhat because of Caltrans' modifications to the First Street on-ramp following the earthquake, which resulted in increased on-ramp capacity.

Average queues on Third Street increased in comparison to pre-earthquake conditions due to higher traffic volumes, primarily during the AM peak hour when most vehicles access the downtown area from the I-80 freeway.

Similar to First Street, but in the opposite direction, Fourth Street represents a major access route to I-80 westbound/U.S. 101 southbound. Average queues during the AM peak hour increased somewhat in comparison to pre-earthquake conditions due to an increase in traffic. The change of the Fourth Street on-ramp from a lane-merge to a lane-add implemented by Caltrans following the earthquake, which resulted in increased on-ramp capacity, counteracted higher PM peak hour existing volumes, and somewhat reduced the average queues on Fourth Street.

Street Network and Freeway System Balance

Prior to the Loma Prieta Earthquake, the TSS and the Embarcadero Freeway provided above grade storage capacity when congestion on I-80/U.S. 101 restricted access to the mainline. The on-ramps for the Embarcadero Freeway and the TSS regularly functioned as elevated parking lots because the multiple on-ramps delivered traffic at greater rates than could be

TABLE 3.3-5
MAXIMUM QUEUE PER LANE (vehicles) AT SELECTED LOCATIONS
PRIMARY STUDY AREA

LOCATION	PRE-EARTHQUAKE		1993 EXISTING	
	AM	PM	AM	PM
The Embarcadero northbound at:				
Bryant Street	12	17	8	8
Howard Street	6	6	8	9
Mission Street	10	6	6	6
Market Street	11	8	11	5
Washington Street	5	6	4	11
Broadway	3	4	17	27
The Embarcadero southbound at:				
Broadway	3	3	13	11
Washington Street	5	3	6	6
Market Street	7	7	14	10
Mission Street	5	4	12	10
Howard Street	6	7	3	3
Bryant Street	7	27	4	26
First Street southbound at:				
Mission Street	5	7	8	9
Howard Street	5	7	10	13
Folsom Street	7	14	5	10
Harrison Street	3	20	3	12
Harrison Street westbound at:				
Spear Street	4	2	5	4
Main Street	4	4	9	10
Fremont Street	6	6	10	6
First Street	8	10	9	8
Fourth Street southbound at:				
Mission Street	8	9	10	10
Howard Street	6	11	4	6
Folsom Street	6	28	10	16
Harrison Street	6	28	6	27
Third Street northbound at:				
Harrison Street	8	12	15	11
Folsom Street	11	10	7	7
Howard Street	11	8	15	10
Mission Street	6	7	7	11
Market Street	14	10	26	17
Bryant Street westbound at:				
Main Street	3	3	5	2
Beale Street	4	3	4	2

Note: Shaded cells indicate a 20% or greater change from pre-earthquake conditions.

Source: Korve Engineering, Inc.

absorbed by the mainline freeway system. With the removal of the elevated structures, vehicles are currently stored on the surface streets, specially those with direct access to the downtown freeway on-ramps such as First Street, Harrison Street and Fourth Street.

Since none of the alternatives considered in this study would replace the Embarcadero Freeway and TSS that existed before the earthquake, a comparison between the pre-earthquake roadway conditions, existing, and future alternatives should also include a discussion of accessibility to and from the I-80/U.S. 101 freeway, during the AM and PM peak hours.

This freeway accessibility would be governed by the total maximum capacity provided by the freeway's ramp system under each alternative at its critical point (usually the connection to the mainline freeway), as well as its overall level of congestion. The relationship between the total capacity provided, and the total vehicle demand estimated to utilize that capacity is the basis of a system balance analysis. A clear way to compare the freeway's ramp system's performance under each alternative is to estimate the demand-to-capacity ratio (d/c ratio) of the ramp system. This d/c ratio has been used as a measure of comparable capacity (i.e., overall capacity of the alternative's freeway ramp system when compared with the pre-earthquake conditions).

Table 3.3-6 shows demand and capacity information for primary study area ramps under pre-quake and existing conditions. The demand to use on- and off-ramps is satisfied by the

TABLE 3.3-6
PRIMARY STUDY AREA FREEWAY RAMPS
DEMAND AND CAPACITY INFORMATION: AM AND PM PEAK HOURS

Facility	**Pre-Quake**		**1993 Existing**	
	AM	**PM**	**AM**	**PM**
On-ramps Total:				
Demand (veh./hour)	7,070	8,850	4,180	5,780
Capacity (veh./hour)	8,600	7,600 (1)	7,700	6,700(1)
Demand to Capacity Ratio	0.82	1.16	0.54	0.86
Off-ramps Total				
Demand (veh./hour)	9,920	5,420	7,170	5,010
Capacity (veh./hour)	11,800	11,800	8,000	8,000
Demand to Capacity Ratio	0.84	0.46	0.90	0.63

(1) Non-HOV on-ramp values only. the PM peak hour of the HOV-only on-ramp at Sterling Street has not been included in this comparison summary because it has a substantially better demand-to-capacity ratio than the rest of the on-ramps, and its inclusion could therefore distort the interpretation of the results, i.e., could show a total demand-to-capacity ratio lower than 1, although the total demand-to-capacity ratio for the mixed flow on-ramps only would be above 1. Source: Korve Engineering, Inc.

capacity provided under the existing AM and PM peak conditions. The same is true under the pre-quake AM and PM peak conditions for the off-ramps and the AM peak conditions for on-ramps. However, a demand to capacity ratio of 1.16 for on-ramps under pre-quake PM peak conditions indicates that congested conditions occurred, which resulted in queues forming on the Embarcadero Freeway.

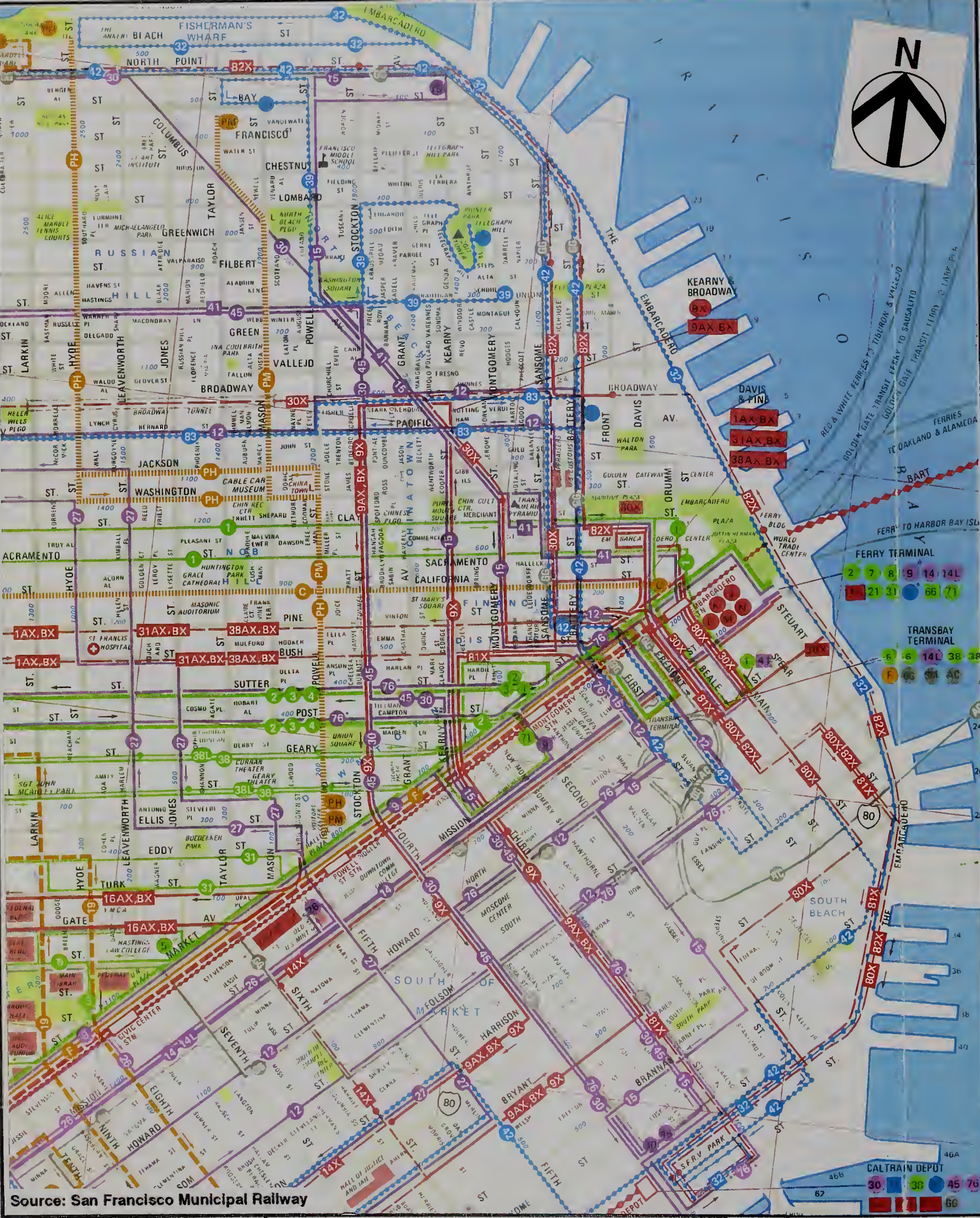
3.3.2 Transit

Prior to the October 17, 1989 Loma Prieta Earthquake, transit services operated much as they do today, with some minor exceptions. Transit ridership volumes, however, changed for some operators. BART, Caltrain and SamTrans all gained ridership into San Francisco, while AC Transit lost ridership. The following briefly describes these services, highlighting service and ridership changes that occurred for each transit operator between the pre-earthquake and existing conditions.

San Francisco Municipal Railway (MUNI)

The San Francisco Municipal Railway (MUNI) provides transit services within the City and County of San Francisco. MUNI operates five types of transit services within the primary and secondary study areas. These are diesel bus, electric trolley bus, MUNI Metro light rail, cable cars, and electric streetcar. MUNI also operates a bus layover facility at Mission and Steuart Streets.

Diesel and electric trolley buses operate throughout the primary and secondary study areas. A total of 37 diesel or electric bus routes operate on one or more street segments within the primary study area. Many bus routes terminate at either the Transbay Terminal, located within the primary study area on Mission Street between First and Fremont Streets, or the MUNI layover yard at Mission and Steuart Streets. Other routes pass through the primary study area. Market Street is the key transit corridor for MUNI routes within the primary study area. Figure 3.3-4 displays a map of existing MUNI services within the downtown area. Prior to the Loma Prieta Earthquake, services were identical to that shown with the exception of Route 42 which previously utilized Second Street between Brannan and Folsom Streets.



Source: San Francisco Municipal Railway

92.202E & 94.060E
Terminal Separator Structure/
Mid-Embarcadero
Roadway Replacement
Project

Existing Muni Bus Routes

Figure 3.3–4

MUNI Metro light rail service operate in tunnels underneath Market Street. Five routes (J-Church, K-Ingleside, L-Taraval, M-Ocean View, and N-Judah) operate through these tunnels before diverging west of the Civic Center to various parts of the City. Three stations are served within the downtown area: The Embarcadero Station, the Montgomery Street Station, and the Powell Street Station. Pre-earthquake service on MUNI Metro was identical to that existing today.

One electric streetcar line (F-Market) uses historic vehicles and offers summer-only service along Market Street between the Transbay Terminal and Castro Street. Prior to the earthquake, this service operated the same as it does today.

MUNI's California Cable Car line operates along California Street, with its eastern terminus at California and Market Streets. The Powell-Hyde and Powell-Mason cable cars operate along Powell Street in the downtown area with a terminus near Powell and Market Streets. Prior to the 1989 earthquake, these services also operated the same as existing.

Daily ridership on MUNI transit services is nearly 800,000[7] per day. For the transit lines which serve the vicinity of the project (see Table 3.3-7), the 37 bus lines carry about 375,000 daily riders, the MUNI Metro lines carry about 131,000 daily riders, the California Cable Car line carries about 12,000 daily riders, and the two Powell Street cable cars serve a combined 31,000 riders each day. Typically, during the morning commute period the inbound services have their greatest loads on the outskirts of the downtown area, and loads decrease as the routes travel through the center of downtown and the Financial District to their route terminus at the Transbay Terminal or the layover yard near the foot of Market Street. Information on MUNI ridership changes between the pre- and post- earthquake periods is not readily available, however, no significant increases or decreases in ridership have been noted by MUNI staff.[8]

MUNI operates a bus layover facility on a 3250-square-meter (35,000-square-foot) lot bounded by Mission, Steuart, Market and The Embarcadero. This facility is also the terminus for 11 MUNI bus lines on Market and Mission Streets.

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[7] MUNI Line-by-Line Ridership, March 1993.

[8] Peter Straus, MUNI, phone conversation, July 26, 1994.

TABLE 3.3-7
MUNI TRANSIT SERVICES: EXISTING CONDITIONS TRANSIT ROUTES IN THE VICINITY OF THE PROJECT

ROUTE		AM Peak Headway	Midday Headway	Daily Riders
1	California	3	6	30,100
1AX	California Exp	8	–	1,300
1BX	California Exp	6	–	2,300
2	Clement	10	20	6,500
5	Fulton	4	8	17,400
6	Parnassus	8	12	9,500
7	Haight	8	12	6,700
8	Market	8	15	8,000
9	San Bruno	8	10	16,600
12	Folsom	20	20	4,200
14	Mission	4	4	47,300
14L	Mission Ltd	–	18	4,800
14X	Mission Exp	8	–	2,100
15	Third	5	10	24,200
21	Hayes	6	10	11,200
26	Valencia	15	20	6,400
27	Bryant	12	15	8,300
30	Stockton	4	6	28,800
30X	Marina Exp	5	–	2,500
31	Balboa	8	12	16,700
31AX/	Balboa Exp	8	–	1,200
31BX	Balboa Exp	10	–	900
32	Embarcadero	12	15	1,800
38	Geary	7	7	31,200
38L	Geary Ltd	7	7	20,500
38AX	Geary Exp	9	–	1,000
38BX	Geary Exp	6	–	1,500
41	Union	4	–	4,100
42	Downtown Loop	9	12	18,700
45	Union-Stockton	6	6	21,200
66	Quintara	20	20	1,500
71	Haight-Noriega	10	12	10,000
76	Marin Headlands	weekends only		
80X	Gateway Exp	10	–	1,900
81X	CalTrain Exp	10	–	1,500
82X	Levi Plaza Exp	20	–	500
83	Pacific	5	10	2,700
F	Market			3,300
J	Church (Metro)	5	10	15,600
K	Ingleside Metro	10	10	27,800
L	Taraval (Metro)	5	10	28,500
M	Ocean View (Metro)	10	10	27,900
N	Judah (Metro)	50	10	15,600
California Cable Car		6	8	
3	Jackson	10	20	4,800
4	Sutter	10	20	5,100
9X	San Bruno Exp	12	12	7,400
9AX	San Bruno Exp	10	–	2,900
9BX	San Bruno Exp	10	–	2,200
Powell/Hyde Cable Car		10	6	16,800
Powell/Mason Cable Car		10	6	14,200

Source: MUNI Line-By-Line Ridership Statistics, March 1993

Golden Gate Bridge, Highway and Transportation District (GGBHTD)

The Golden Gate Bridge, Highway and Transportation District (GGBHTD) provides transit services between Marin and Sonoma Counties and San Francisco. GGBHTD operates 31 diesel bus routes in the vicinity of the project and also provides ferry service between Larkspur and Sausalito and the San Francisco Ferry Building. Figure 3.3-5 shows a map of GGBHTD bus and ferry services which operate to the study areas, and Table 3.3-8 displays information about each of the GGBHTD routes.

Twenty of the bus routes are commute routes operating only during the peak commute period. Eight routes operate throughout the day, two routes provide timed connections with GGBHTD ferry trips as a shuttle service from the Ferry Building to employment locations in San Francisco, and one route provides Christmas season-only service connecting ferry passengers at the Ferry Building with downtown shopping locations. Prior to the Loma Prieta Earthquake, GGBHTD operated five fewer bus routes (Routes 30, 44, 56, 61, and 90 were not in operation). Service mileage on the 26 routes that did operate prior to the earthquake was about nine percent less compared to 1992 levels; however, passenger capacity was about the same because higher capacity buses were used during the pre-earthquake period.

Within downtown and vicinity, the primary transit corridors for GGBHTD routes are the Sansome and Battery Street one-way couplet, and the Howard and Folsom Street one-way couplet. GGBHTD also operates a bus layover yard south of Folsom Street between Main and Spear Streets. The layover yard, which stores up to 128 buses (118 buses actually park there on an average day), is used solely for midday storage by GGBHTD.

Ferry services operate during most times of the day. Thirteen daily round trips are provided on the Larkspur Ferry and ten round trips on the Sausalito Ferry. These were the same level of ferry services operated by GGBHTD prior to the Loma Prieta Earthquake.

Daily ridership is approximately 18,000 on the GGBHTD bus services for travel to and from San Francisco, and about 5,000 on GGBHTD ferry services.[9] Neither bus ridership nor ferry patronage has changed significantly from pre-earthquake levels.[10]

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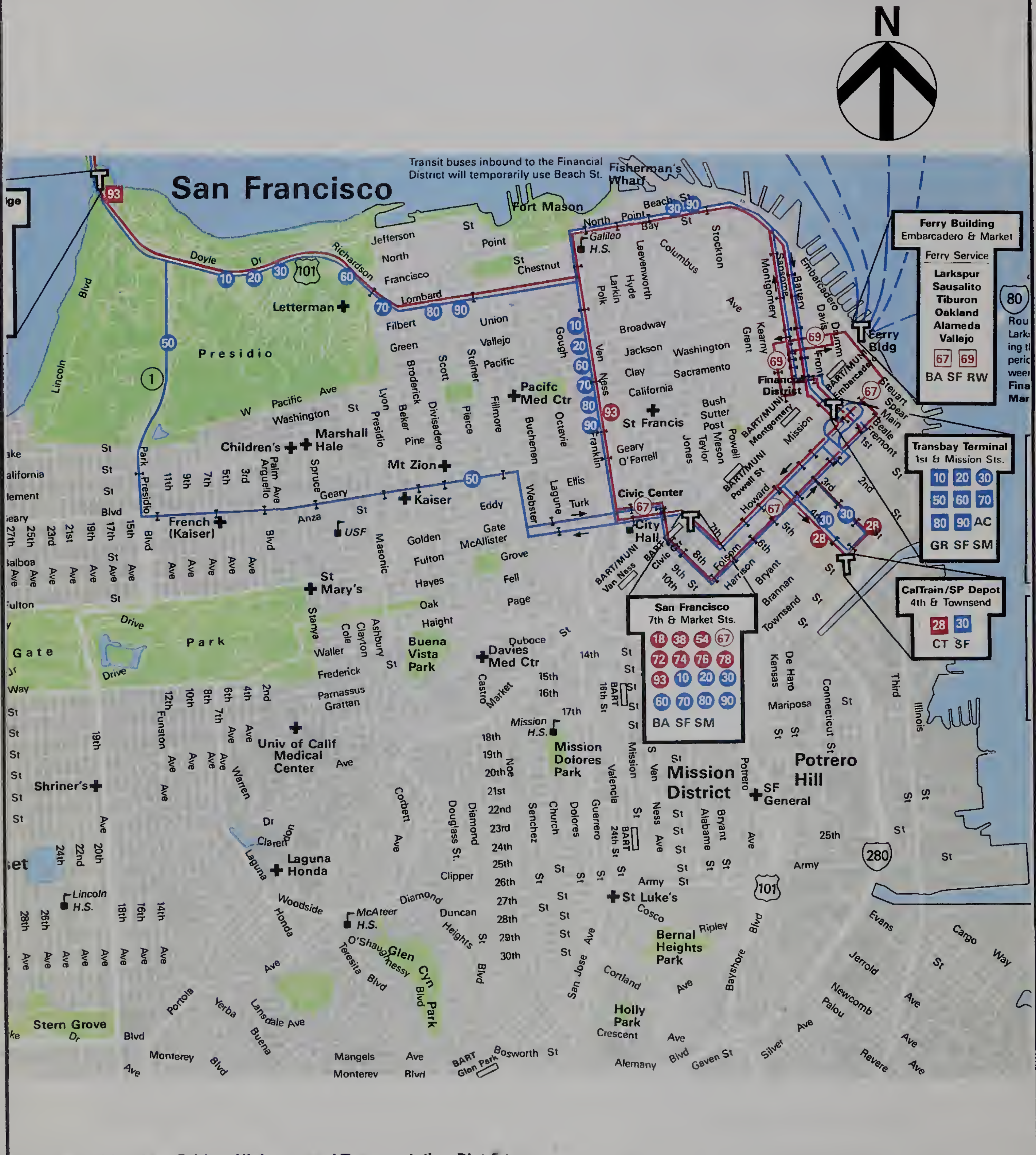
[9] GGBHTD Ridership Statistics, April 1993.

[10] Alan Zahradnik, GGBHTD, phone conversation, April 22, 1993.



Source: Golden Gate Bridge, Highway, and Transportation District

92.202E & 94.060E
Terminal Separator Structure/
Mid-Embarcadero
Roadway Replacement
Project

Existing Golden Gate Bus Routes

Figure 3.3–5

TABLE 3.3-8
GOLDEN GATE TRANSIT SERVICES
EXISTING CONDITIONS
TRANSIT ROUTES SERVING DOWNTOWN SAN FRANCISCO

Route	AM Peak Headway	Midday Headway	Daily Riders
2	12	--	500
4	6	--	1,900
8	15	--	400
10	30	30	1,100
18	9	--	1,000
20	30	30	1,100
24	6	--	1,600
26	15	--	700
28	25	--	100
30	60	60	200
32	40	--	200
34	29	--	300
38	15	--	600
44	22	--	300
48	26	--	200
50	30	30	800
52	30	--	200
54	5	--	1,700
56	30	--	100
60	1 trip	--	100
61	Christmas Only	--	
67	30	--	100
69	30	--	100
70	30	--	500
72	17	--	600
74	10	--	1,200
76	10	--	700
78	38	--	200
80	30	30	1,300
90	2 trips	--	100
93	13	--	100
Larkspur Ferry	30	120	3,400
Sausalito Ferry	70	90	1,500

Source: GGBHTD Ridership Statistics, April 1993

San Mateo County Transit District (SamTrans)

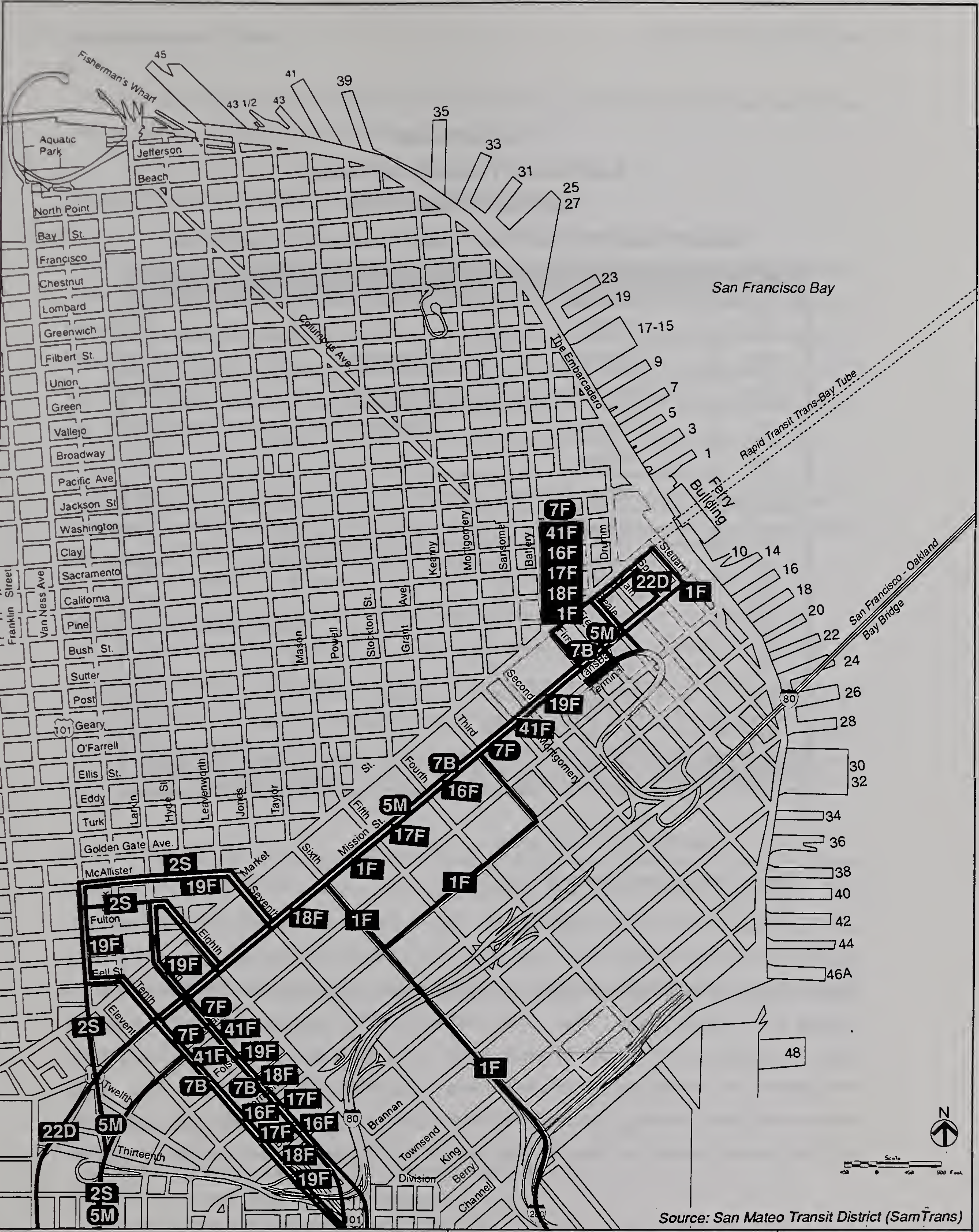
The San Mateo County Transit District (SamTrans) provides transit services between San Mateo County and downtown San Francisco. SamTrans operates thirteen diesel bus routes, all of which serve the Transbay Terminal, and several of which also serve other locations in the Financial District. Ten of these routes operate as peak-only commute routes, while the remaining three provide service throughout the day. SamTrans buses use Mission Street as their primary transit corridor within the downtown and vicinity.

Service prior to the Loma Prieta Earthquake was essentially the same as existing, except that Route 41F did not operate. Existing (1994-1995) SamTrans bus routes serving downtown San Francisco are shown in Figure 3.3-6.

Ridership since the earthquake is greater than from before the earthquake. Approximately 12,800 daily riders use SamTrans service for travel to and from downtown San Francisco after the earthquake compared to about 11,100 before the earthquake. Table 3.3-9 displays ridership and service information for SamTrans routes.

Bay Area Rapid Transit District (BART)

The Bay Area Rapid Transit District (BART) operates heavy rail transit between East Bay counties and San Francisco and between northern San Mateo County and San Francisco. BART and the Peninsula Commute Service (CalTrain) are the only two regional rail transit services to San Francisco. BART service within the downtown area is similar to that described for MUNI Metro service, with trains running in tunnels under Market Street. Stations served include the Embarcadero, Montgomery Street and Powell Street Stations, all of which are in the primary study area. Train headways through San Francisco are 3.75 minutes in the peak direction during the peak commute period. Services operated prior to the earthquake were similar to those operated today, with identical peak period train headways through San Francisco.



Source: San Mateo Transit District (SamTrans)

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator

Existing SamTrans Bus Routes

Figure 3.3-6

TABLE 3.3-9
SAMTRANS TRANSIT SERVICES
EXISTING CONDITIONS
TRANSIT ROUTES SERVING DOWNTOWN SAN FRANCISCO

Route	AM Peak Headway	Midday Headway	Daily Riders(1)
1F	5 trips	--	700
5M	10 minutes	20 minutes	4,000
7B	30 minutes	30 minutes	2,700
7F	10 minutes	30 minutes	2,300
16F	4 trips	--	300
17F	3 trips	--	100
18F	7 trips	--	300
19F	4 trips	--	300
22D	20 minutes	--	1,400
41F	3 trips	--	100
47F	5 trips	--	300
48F	1 trip	--	100
49F	4 trips	--	200
TOTAL			**12,800**

(1) Includes only riders To San Francisco

Source: SamTrans Ridership Statistics, 1993-1994

Current system-wide ridership is about 251,000 per day, with about 119,000 riders passing through the Transbay Tube. Over 15,000 riders use BART between San Mateo and San Francisco Counties, over 11,000 of which travel to the three BART stations (Embarcadero, Montgomery, and Powell) in the downtown area. Pre-earthquake ridership was less: daily system-wide BART ridership was about 212,000 during the pre-earthquake period, of which 103,000 traveled through the Transbay Tube and 11,800 traveled between San Mateo and San

Francisco Counties. Daily ridership from San Mateo County to the three study area stations was about 8,900 prior to the Loma Prieta Earthquake.[11]

Alameda-Contra Costa County Transit (AC Transit)

The AC Transit provides commuter bus service between East Bay locations and the Transbay Terminal in San Francisco. Currently, AC Transit operates 33 routes on its Transbay commute service; of which 29 routes operate only during peak commute periods. These routes access the bus deck of the Transbay Terminal directly from the Bay Bridge and are not required to operate on surface streets in San Francisco. Approximately 14,400 passengers ride AC Transit buses to and from San Francisco each day[12].

Prior to the Loma Prieta Earthquake, AC Transit operated 36 routes on the Transbay service, 31 of which operated only during peak commute periods. Pre-earthquake ridership on AC Transit transbay service averaged about 18,500 passengers each day in 1989.[13]

Other Transit Services

Several other transit services also operate in or near the downtown area. These include the Peninsula Commute Service (PCS or CalTrain), ferry services to the Ferry Building, Airporter buses, Amtrak Feeder Buses, Gray Line tour buses, and a variety of other smaller tour bus lines mostly operating from the Transbay Terminal.

The Peninsula Commute Service operates diesel-powered, locomotive-hauled heavy rail transit services along the San Francisco Peninsula between San Jose and San Francisco. The northern terminus of the line is located at Fourth and Townsend Streets in San Francisco (within the boundaries of the secondary study area). Thirty round trips per day are offered, carrying about 21,000 daily riders of which about 13,000 used the Fourth and Townsend Street Station.

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[11] BART, Station of Origin Data Summary, March 1989 and January 1991.

[12] Don Larson, Ac Transit, phone conversation, February 7, 1995.

[13] Don Larson, AC Transit, phone conversation, February 7, 1995.

Prior to the earthquake, twenty-six daily round trips were offered, carrying about 17,000 daily riders, of which about 10,000 used the Fourth and Townsend Street Station.[14]

A number of ferry operators provide service to the Ferry Building in addition to the GGBHTD service discussed above. Service from Tiburon is provided by the Red and White Fleet. Seven daily trips are provided, serving about 750 passengers per day. They also provide three summer and two winter round trips per day from Vallejo. This service carries 275 to 300 passengers per day. Harbor Bay Maritime operates six peak commute period round trips and four midday round trips (Monday and Friday only for midday trips) daily between Alameda and the Ferry Building. Current ridership on this service is about 400 passengers per day. The Blue and Gold Fleet also operates ten round trips per day between Alameda and the Ferry Building, carrying about 700 passengers per day. Other ferry services include service to Oakland and tours to tourist destinations around the Bay. Prior to the Loma Prieta Earthquake, the ferry service to Alameda and Oakland did not exist. The remaining ferry services operated the same as exists today.

Airporter buses provide service between downtown San Francisco hotels and the San Francisco Airport. This service is provided at twenty minute intervals throughout the day. Pre-earthquake service was essentially the same as existing.

Amtrak feeder buses provide connections between the San Francisco CalTrain Station, the Ferry Building and the Amtrak Station in Oakland. Ten round trips per day are offered. Pre-earthquake service was essentially the same as existing except buses stopped at the Transbay Terminal rather than the Ferry Building.

Greyhound bus service is provided from the Transbay Terminal. Gray Line tour buses provide tours to various destinations in San Francisco and the Bay Area. Services are offered from the Transbay Terminal and from Union Square. Pre-earthquake service was essentially the same as existing.

A number of other tour bus operators provide services within the downtown area. Most of these operate out of the Transbay Terminal. Service to Reno, Yosemite, and other inter-city or Bay Area locations are available.

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[14] CalTrain Short-Range Transit Plan FY 1994-2002, September 1993

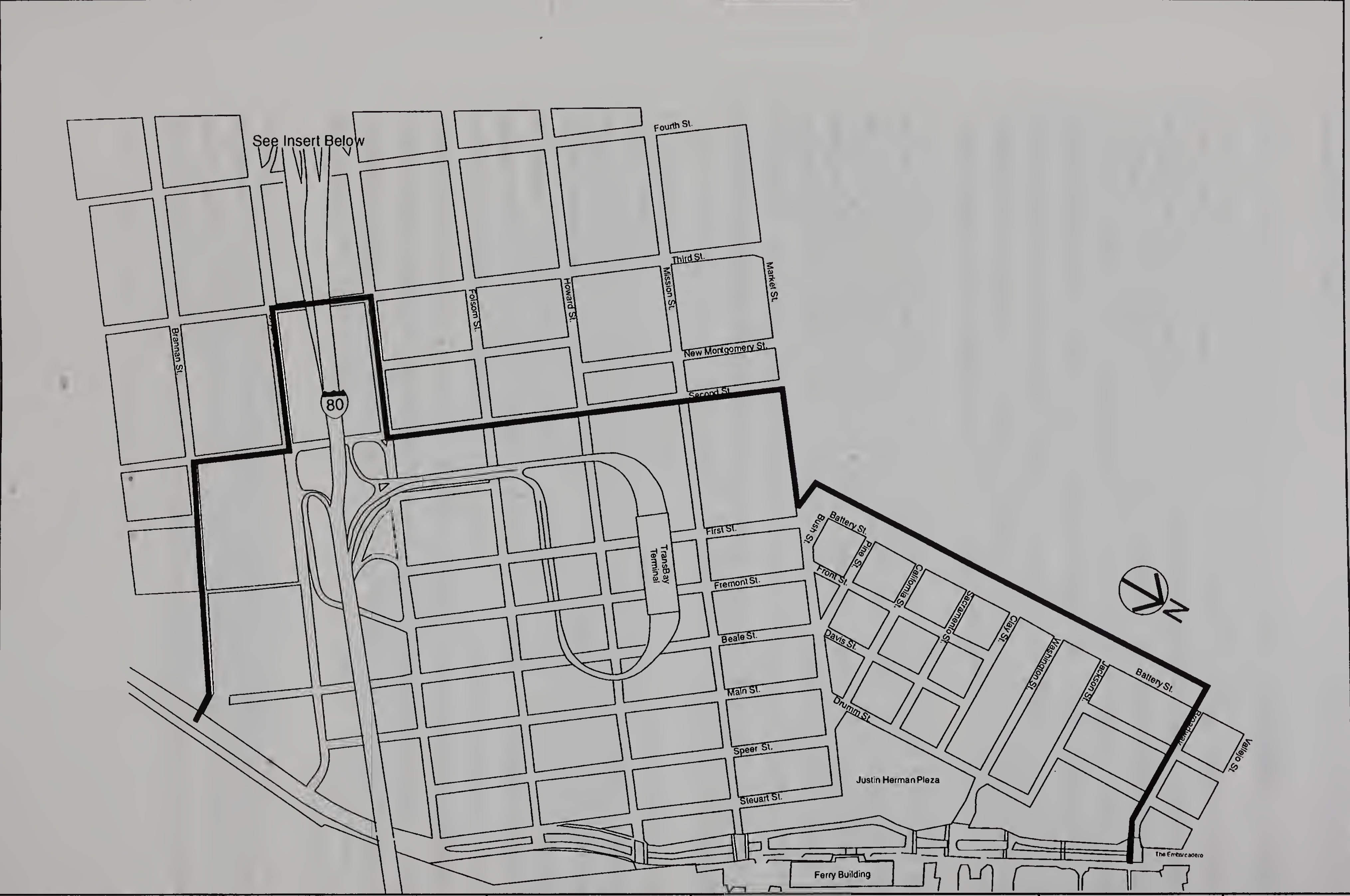
3.3.3 PARKING

Parking conditions and project impacts were studied for two areas: a primary parking study area; and a focused parking study area (see Figure 3.3-7 and Figure 3.3-8). Within the primary and focused study areas, three agencies are responsible for managing parking. The Port of San Francisco is responsible for on-street and off-street parking resources within its jurisdiction, including spaces along the Embarcadero Roadway. The San Francisco Department of Parking and Traffic is responsible for on-street parking outside Port jurisdiction. Off-street parking resources outside Port jurisdiction are generally privately owned and managed. Some off-street parking areas are on land owned by Caltrans, which generally leases lots to private operators.

The Port of San Francisco has management and budgetary responsibilities distinct from the City, and many of the Port's decisions must respond to the broader authority of the Bay Conservation and Development Commission (BCDC). BCDC's plans and policies establish planning and investment regulations, within which the Port must operate, and BCDC has the authority to regulate the location of parking facilities within their jurisdiction. For example, parking is not allowed over the water, and parking is only temporarily permitted on Pier 3 by special permit; this permit is scheduled to expire in 1998.

Prior to the Loma Prieta Earthquake, there were 19,316 parking spaces in the primary parking study area, of which over 86% were found in off-street garages and lots. In 1993-94, total parking spaces in this area had declined to 18,663, or a loss of 3%. These changes are set forth in Table 3.3-10, which also delineates changes in the number of parking spaces under Port jurisdiction between pre-earthquake and the existing conditions. Excluding the focused parking study area, there were fluctuations in the parking supply between 1989 and 1993 at locations where the Terminal Separator Structure was removed. At these locations, off-street as well as on-street parking spaces were retired from operation during demolition of the Terminal Separator Structure. Following demolition, many of the lots were restored to service, resulting in only minor changes in the total number of parking spaces available between the beginning and end of the period.

Within the focused parking study area, there occurred similar changes in parking resources due to the demolition of the Embarcadero Freeway. On-street and off-street parking spaces beneath and adjacent to the freeway were taken out of service during the Freeway's removal,



Source: San Francisco Department of Public Works
Douglas Wright Consulting

LEGEND

▬ Parking Study Area

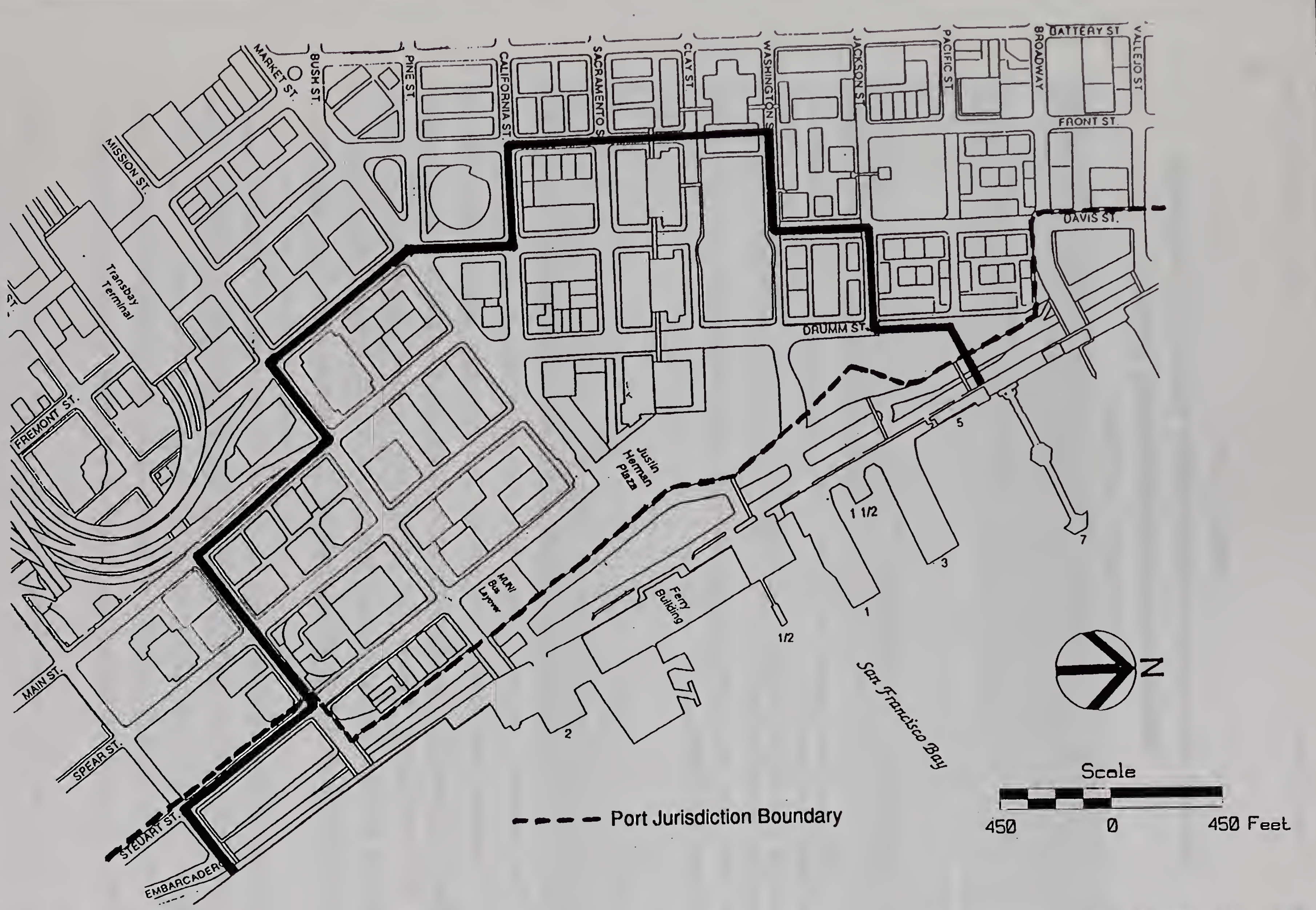
GRAPHIC SCALE

0 100' 200' 300' 400' 500' 600' 700' 800' 900' 1000'

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

Primary Parking Study Area

Figure 3.3-7



Source: Douglas Wright Consulting

92.202E & 94.060E
Alternatives to Replacement
of the Embarcadero Freeway
and the Terminal Separator Structure

Focused Parking Study Area

Figure 3.3–8

TABLE 3.3-10

CHANGE IN PARKING WITHIN PRIMARY PARKING STUDY AREA PRE-EARTHQUAKE AND EXISTING SPACES

LOCATION	PRE-QUAKE	EXISTING	VARIANCE	% CHANGE
Off-Street Port Spaces	1,458	1,143 (1)	-315	-(22%)
On-Street Port Spaces	371	200 (2)	-171	-(46%)
On-Street City Spaces	2,317	2,317	0	0%
Off-Street City Spaces	15,170	15,003	-167	-(1%)
TOTAL SPACES	**19,316**	**18,663**	**-653**	**-(3%)**

(1) Around 50 of these spaces have been temporarily displaced by construction of the MUNI-Metro Turnback, but could be replaced following construction.

(2) Around 25 of these spaces have been temporarily displaced by construction of the MUNI-Metro Turnback but could be replaced following *construction*.

Source: Port of San Francisco; San Francisco Department of City Planning; San Francisco Department of Parking and Traffic; Douglas Wright Consulting

and then placed back into operation following the demolition. As set forth in Table 3.3-11, other Port parking resources were also changed during the period from pre-earthquake to existing. Pier 1/2 underwent improvements for commute ferry operations and the parking lot was reconfigured, reducing the number of parking spaces available. South of the Ferry Building, along The Embarcadero (Seawall Lots 327/347/348), off-street spaces were permanently displaced by the construction of the South Embarcadero project. Between 1988 and 1994, Port parking within the focused study area was reduced by 486 spaces, a loss of more than 26%.

The City Planning Department conducted a Downtown Parking Survey in 1991 which found an overall occupancy rate of 70.4% for off-street and on-street parking spaces in greater downtown, 77.9% in the C-3-O District, and 71% in the south of Market area. In June, 1994, a survey[15] was conducted for all public off-street parking facilities within the focused parking study area. The survey found usage rates throughout the area exceeded those observed in the

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[15] Survey conducted on June 7-9, 1994 by Douglas Wright Consulting and Pittman & Hanes.

TABLE 3.3-11

PORT OF SAN FRANCISCO OFF-STREET PARKING INVENTORY

	PRE-QUAKE		EXISTING	
LOCATION	**GARAGE**	**LOT**	**GARAGE**	**LOT**
Pier 1	225		225	
Pier 1/2		112		76
Pier 3		193		193
Pier 3-5		3		3
Agriculture Bldg/Sinbads		89(1)		89(1)
Embarcadero Median		317		344(2)
Ferry Bldg. Meters		79		79
Seawall 348		-		+
Seawall 347s		166		+
Seawall 327		140		+
Seawall 351		134		134
TOTALS	**225**	**1,233**	**225**	**918**
TOTAL SPACES	**1,458**		**1,143**	

(1) Short-term Spaces

(2) 100 of these are short-term spaces

+ Current construction staging site (to be occupied by the realigned Embarcadero roadway following completion of the MMT Project).

The following assumptions were made regarding the data:

1) Seawall Lot 351 = Chevron Station
2) 20 spaces at Ferry Building not included (no public space -- Port vehicles only).
3) Pier 24 -- 28 are outside Primary Parking Study Area
4) No pre-quake data for Seawall Lot 348
5) Around 50 of the 344 spaces in the median of the Embarcadero have been displaced by construction of the MUNI-Metro Turnback, but could be replaced following construction.

Source: Port of San Francisco; Douglas Wright Consulting

previous C-3-O District survey. All but one facility registered occupancy rates greater than 85% during the weekday afternoon survey period.

Estimates for Port parking in the focused study area, both on-street and off-street, indicate an average occupancy of more than 80% for weekday periods. The existing Port parking resources may be classified into two categories: space available for monthly lease, which are generally located on the piers or in the median of The Embarcadero, and spaces available for short-term use, which are metered spaces generally located on the street.

3.3.4 GOODS MOVEMENT

Prior to the Loma Prieta Earthquake, the Embarcadero surface roadway served as the principal route for truck movements both within and through the project study area. Movement of trucks through the study area was directed by specific signed routings to and from the Bay Bridge and Peninsula highways (Bay Bridge, I-80/U.S. 101 South, I-280 South). Such routes included Harrison, Fremont, Folsom, Bryant, Townsend, and Battery Streets. The Embarcadero surface roadway served as the waterfront service road linking activities on the northern waterfront to streets that connected to the Embarcadero Freeway and the regional highway system. These activities included hotels, restaurants, and fish processing near Fisherman's Wharf, the ocean cruise terminal at Pier 35, the Pier 27-29 break-bulk terminal, the Foreign Trade Zone, and the newsprint terminal at Piers 15-17.

The Embarcadero Freeway provided direct truck access to and from destinations in the Broadway and Washington/Clay corridors, such as Chinatown and North Beach, and locations south on the Peninsula or east across the Bay Bridge. The Embarcadero Freeway also diverted automobile traffic away from the Embarcadero surface roadway, thus reducing congestion levels which would have slowed goods movements on local streets under and around the freeway. Prior to the earthquake, turning movements across the center line of the Embarcadero surface roadway were restricted between Broadway and Howard Streets, where the Embarcadero Freeway and a widened median obstructed such movements. This restriction meant that pier locations between Broadway and Howard Street were accessible to northbound trucks only, and necessitated U-turn movements at Howard and Folsom Streets for southbound trucks.

In 1994, following the demolition and removal of the Embarcadero Freeway and the Terminal Separator Structure, the Embarcadero surface roadway continued to serve as the principal truck route within the study area, and goods movement patterns were not greatly altered. Commercial activities generating goods movements within the study area and along the waterfront are generally the same as in 1989, and although travel times have increased due to congestion, and the number of access points between local streets and the regional highway system has been reduced, trucks are still directed to use the Embarcadero roadway to reach points north and south of the study area

There is no direct vehicular connection between Market Street and The Embarcadero, so trucks use Steuart and Mission Streets. Left turns by trucks from the northbound lanes of The Embarcadero and right turns from the southbound lanes are permitted at Howard Street, Mission Street, Washington Street and Broadway. South of Howard Street, The Embarcadero had been modified, by 1994, to its permanent boulevard design (with a double-track light rail line in the median), thus precluding access across the center line, available in 1989.

3.3.5 PEDESTRIAN AND BICYCLES

Prior to the Loma Prieta Earthquake, pedestrian sidewalk and crosswalk facilities were effectively the same as they are today. There are no dedicated bicycle facilities and The Embarcadero has sidewalks along both sides for pedestrian movements, except for two locations on the west side where The Embarcadero once had intersections with Jackson and Pacific Streets. These locations currently contain metered parking with the parking areas used by pedestrians in lieu of sidewalks.

Six of the nine crosswalk locations along the Mid-Embarcadero surface roadway are served by traffic signals. These are at Folsom Street, Howard Street, Mission Street, the Ferry Building, Washington Street, and Broadway. The remaining three crosswalks are either mid-block or at unsignalized intersections with no signal protection for the pedestrian movements. All high traffic volume intersections of the TSS area have traffic signals.

Pedestrian counts were conducted in November 1992 and April 1993 for the Mid-Embarcadero area and in June 1994 for the TSS area. These counts were compared to counts conducted for other studies prior to the earthquake. Separate bicycle counts were not taken for this study (they are included in the pedestrian counts), nor were they available from any of the pre-earthquake studies. However, it was observed during the counts that bicycle volumes represent only a small fraction of the total non-motorized movements in the study area.

Mid-day pre-earthquake pedestrian counts were similar to the 1992-1994 counts with some exceptions. Most notably the post-earthquake counts for the noon peak period tended to be significantly higher for The Embarcadero than for the pre-earthquake period. For instance, noon-hour pedestrian volume at the crosswalk in front of the Ferry Building increased from about 700 pedestrians in 1983 to about 1200 in 1992. Similar increases in noon crosswalk volumes occurred at other locations. This increase is most likely due to removal of the Embarcadero Freeway which has made lunchtime excursions to the waterfront more enjoyable for downtown workers.

AM and PM peak hour pedestrian counts are generally similar between the pre- and post-earthquake surveys. The single exception is at the Ferry Building crosswalk where the existing counts are 20 percent lower in the AM and 35 percent lower in the PM than the one for the pre-earthquake period. This is an unexpected result because ferry service at the Ferry Building has increased since the earthquake and few factors that could result in this magnitude of lower pedestrian volumes have been identified. This discrepancy may be the result of seasonal variations, weather, shifts in pedestrians to other crosswalks, or other factors.

3.4 SOCIAL AND ECONOMIC ENVIRONMENT

While the California Environmental Quality Act (CEQA) does not require analysis of social or economic factors except as they may relate to physical environmental effects, the National Environmental Policy Act (NEPA) does require socioeconomic factors to be considered. As a result, the following section identifies the neighborhoods or communities in the vicinity of the project under pre-earthquake and existing conditions, along with some of the focal points that physically define those neighborhoods, and the boundaries or obstructions between or through neighborhoods. This section also describes the economic and business characteristics of the downtown and vicinity, including pre-earthquake and existing employment levels and post-quake changes in access to tourist-serving neighborhoods north of the Financial District, such as Chinatown, North Beach, and the Fisherman's Wharf area.

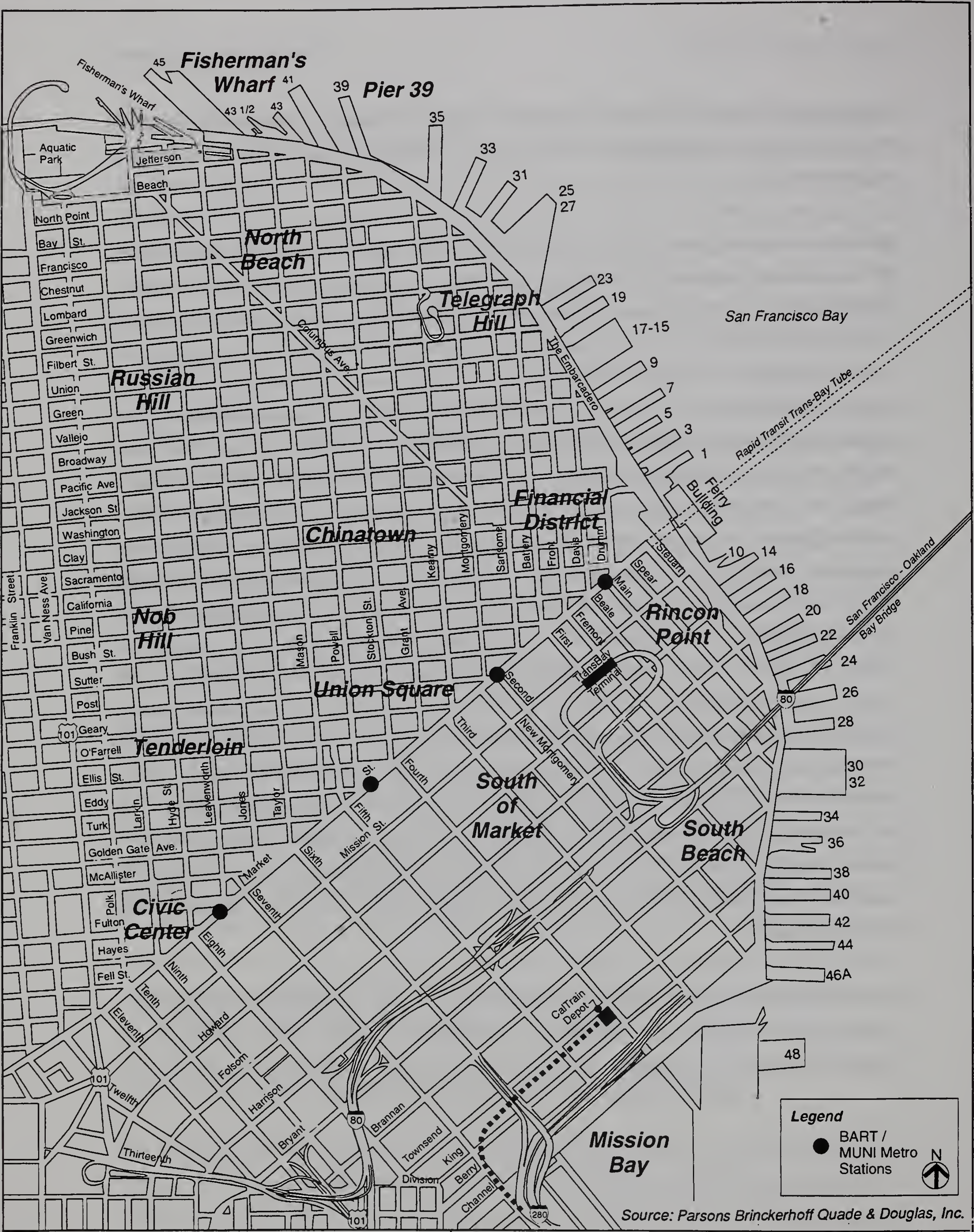
3.4.1 COMMUNITY AND NEIGHBORHOOD CHARACTERISTICS

The downtown area of San Francisco is considered a major center for commercial, retail and cultural activities in the greater Bay Area. Within the Downtown and Vicinity are a number of recognized districts which serve as major destination points for residents, workers and tourists.

These districts contain a wide variety of community focal points which contribute substantially to the character of the neighborhood in which they occur. (See Figure 3.4-1 for general location of neighborhoods.)

Chinatown is located north of the Financial District, on the eastern slopes of the Nob Hill and Russian Hill neighborhoods. Community focal points in this area include Portsmouth Square, Old St. Mary's Church, St. Mary's Square and the Stockton Street shopping corridor, which serves as a "Main Street" in this neighborhood. The North Beach neighborhood is located to the north of Chinatown at the base of Telegraph Hill, and is centered on Columbus Avenue. This area has historically served as a focal point of Italian-American activity, and has a wide variety of restaurants, specialty stores and cafes. Community focal points in the North Beach neighborhood include Washington Square, St. Peter and Paul Church and the North Beach Playground. Situated between the Financial District and the North Beach neighborhood is Jackson Square, an historic district with a concentration of design-related businesses and restaurants. At the eastern edge of the Jackson Square area is the Golden Gateway residential neighborhood, centered on Sydney G. Walton Square. This area has the highest residential density proximate to the Financial District. Community focal points in this area, in addition to Sydney G. Walton Square, include waterfront features such as the Pier 7 walking pier. The middle portion of the primary study area, the Financial District, is less a neighborhood than a major center of commercial, retail, recreational and cultural activity. In the midst of this area are a number of community focal points which serve as primary defining characteristics. These include: the Ferry Building and Ferry Plaza, Justin Herman Plaza, Maritime Plaza, The Embarcadero Center, the Embarcadero, Montgomery Street and Powell Street MUNI/BART stations, San Francisco Center, Pier 3 and the historic Santa Rosa ferry boat, the California Street and Powell Street Cable Car lines, Union Square, Hallidie Plaza, and numerous office towers and plazas.

South of the Financial District is the greater South of Market Area (SOMA), which includes Yerba Buena Center, Rincon Point, Rincon Hill and South Beach. Each of these sub-areas has a residential population and an eclectic mix of non-residential uses. Major community focal points



Source: Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator

Neighborhood Location Map

Figure 3.4-1

contributing to the character of these areas include: One Market Plaza, the Embarcadero Promenade, Rincon Center, the Transbay Terminal, Moscone Convention Center, Yerba Buena Gardens, the new Museum of Modern Art, the Jewish Museum, St. Patrick's Church, Hills Plaza, Delancey Street Foundation, South Park, Golden Gate University, and numerous small parks, office towers and plazas. In the vicinity of the Second Street/Stillman Street intersection there are a number of groups or communities, including members of the Clock Tower Homeowners Association, business owners, tenants, and residents of the area.

A number of recognized districts and neighborhoods with a wide variety of community focal points encircle the greater downtown area. From north to south, these include: Fisherman's Wharf, Pier 39, Aquatic Park, Ghirardelli Square, Russian Hill, Nob Hill, the Van Ness Avenue corridor, the Polk Street corridor (including Polk Gulch), the Tenderloin, Civic Center, the eastern part of the South of Market Area (including Showplace Square and Multimedia Gulch), China Basin, the northern base of Potrero Hill, and Mission Bay. Within these areas is a broad range of community focal points, including parks, plazas, historic buildings, churches, entertainment and tourist attractions, transportation stations, and shopping centers.

Prior to the 1989 earthquake, the eastern and southeastern portions of the greater downtown area were dominated by the elevated Embarcadero Freeway and the Terminal Separator Structure. The elevated freeway created a physical, visual and psychological barrier along the City's eastern waterfront, separating the lower Market Street area from the Embarcadero Promenade and other waterfront features. The Terminal Separator Structure also created physical, visual and psychological barriers, dominating portions of the South of Market Area and separating it from Rincon Hill, South Park, and the south Embarcadero area. The removal of these structures, completed in early 1992, has been the single most significant change to the characteristics of these areas since the earthquake. Physical and visual access to community focal points and businesses on the east side of the Embarcadero roadway and in the vicinity of Rincon Hill increased with the removal of these structures. The removal has also resulted in improved pedestrian access to the waterfront and around SOMA.

3.4.2 ECONOMIC AND BUSINESS CHARACTERISTICS

In 1980, approximately 94 percent of employed residents of San Francisco worked in the City. In 1989, this percent increased to approximately 96 percent, and in 1990, decreased to approximately 93 percent.[16]

San Francisco had a total of 553,440 jobs in 1985 and 583,960 in 1990, a 5.51 percent increase over the period.[17] In 1993, San Francisco had an estimated 556,030 jobs, lower than 1990 figures and reflecting the effects of the national recession on California[18]. The job categories with the greatest number of workers (both in 1985 and 1990) were Services and Other. The distribution of jobs within categories shifted substantially during the period from 1985 to 1990, with increases in Wholesale Trade (56 percent), Agriculture/Forestry/Mining (22 percent)[19], Services (21 percent), and Retail Trade (10 percent), and decreases in Manufacturing (five percent) and Other (11 percent). These dramatic changes reflect the volatility of the office market and support services in San Francisco over the period, the increasing decentralization of regional employment, and national economic conditions.

In the pre-earthquake condition, the elevated Embarcadero Freeway provided convenient access between the regional highway network (I-80 via the Terminal Separator Structure) and such neighborhoods as Chinatown, North Beach, Fisherman's Wharf, Jackson Square, Pacific Heights and Russian Hill. In the post-earthquake condition, these elevated transportation facilities have been removed. Vehicles traveling to and from the regional highway network and these neighborhoods must now share surface streets with Financial District and SOMA traffic, adding an estimated three to five minutes of travel time under normal driving conditions. Under all project alternatives, the Embarcadero Freeway would not be rebuilt, perpetuating this increase in travel time, as compared to the pre-earthquake condition. The following discussion attempts to explain various theories and issues about the economic effects of the removal of the Embarcadero Freeway in this part of San Francisco. It is important to note that removal of the Embarcadero Freeway is not part of the project, but was necessitated by the 1989 Loma Prieta Earthquake.

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[16] California Employment Development Department, Labor Market Information Division, *Report 400R-Coastal,* May 10, 1993.

[17] Association of Bay Area Governments, *Projections '92*, July 1992.

[18] The job loss in Downtown San Francisco has recently been documented in the San Francisco Planning Department's 1994 Downtown Plan Monitoring Report.

[19] Office employment related to Agriculture/Forestry/Mining is reflected in the category.

At the time of the closure, and then removal, of the Embarcadero Freeway after the 1989 Loma Prieta Earthquake, there was a drop-off in business revenues in the commercial areas of Chinatown, North Beach and Fisherman's Wharf, particularly for businesses serving the Bay Area region and tourists. The loss of a direct freeway connection between I-80 and these neighborhoods is considered by some to be a contributing factor in this economic downturn. The North Beach Chamber of Commerce has indicated that local business dropped nearly 30 percent since the earthquake, and that by tracking credit card receipts, North Beach businesses have determined that the majority of the customers lost were from the East Bay.[20]

Some economists believe that many East Bay residents began patronizing local restaurants and businesses, rather than coming to or staying in San Francisco, because of the earthquake's impacts on regional travel, including the partial collapse of the Bay Bridge and the permanent closure of the Embarcadero Freeway. Port tenants have also seen a decline in retail revenues since the Loma Prieta Earthquake.[21]

In letters submitted in the fall of 1992 to the City during the first public scoping period for the proposed project, both the San Francisco Chamber of Commerce and the Fisherman's Wharf Port Tenants Association indicated that the 1989 earthquake and subsequent removal of the Embarcadero freeway resulted in adverse economic impacts on businesses in Chinatown, North Beach and Fisherman's Wharf.[22]

Another factor contributing to the economic downturn occurring in these neighborhoods was the national economic recession, which became more severe in the Bay Area in the summer of 1989 prior to the Loma Prieta Earthquake. In 1990, one year after the earthquake, the San Francisco Business Times reported that most sectors of the Bay Area economy had rebounded from the effects of the earthquake, but were still suffering the effects of the national recession.[23] The article notes that a quarterly analysis by the accounting firm Grant Thornton of seven economic indicators showed a slowdown in the Bay Area economy six months before the earthquake. Likewise, the article noted that Fritz Arko, general manager of Pier 39 and president of the

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[20] Marcia Garland, Executive Director, North Beach Chamber of Commerce, personal communication, March, 1993.

[21] San Francisco Examiner, March 19. 1993, *Supervisors Panel Votes to Stop Caltrans,* page A-8.

[22] Michael Gallette, Executive Director, The Fisherman's Wharf Tenants Association, letter to San Francisco Department of City Planning, September 14, 1992.

[23] San Francisco Business Times, *Earthquake Aftermath One Year Later,* October 16, 1990, page 1.

Fisherman's Wharf Association, believed "any negative effects from the earthquake have now been eclipsed by an economic slowdown." It should also be noted that San Francisco Visitor Statistics prepared by the San Francisco Convention and Visitors Bureau, show trends of steadily increasing tourism activity since 1991.[24]

In the immediate vicinity of the proposed project, one business was displaced by demolition and removal of the Embarcadero Freeway and Terminal Separator Structure (California Cafe, located on Broadway between Front and Battery Streets). The number and location of other businesses have remained relatively unchanged since the earthquake. Table 3.4-1 lists the businesses currently located along the Mid-Embarcadero corridor. The majority of these businesses have been located in the waterfront area of San Francisco since before 1989. Most of the professional and industrial companies serve regional, national and international customers. Many of these businesses are dependent upon regional access for their work force and business.

3.4.3 PUBLIC SERVICES

Fire protection services in the primary study area are provided by two San Francisco Fire Department (SFFD) stations located within Fire Service Administrative Division I. Station 35, located on Pier 22-1/2 on The Embarcadero at Harrison Street, houses Engine Company 35 and Fire Boat Company 1. This station serves the southern half of the primary study area. Station 13 is located on Washington Street at Sansome Street and serves the northern half of the primary study area. Other stations in San Francisco also assist in responding to larger emergencies. Police patrol and emergency response services in the study area are provided by units from the Central Police Station on Vallejo Street in North Beach and the Southern Station on Bryant Street at the Hall of Justice.

Public school facilities area are operated by the San Francisco Unified School District (SFUSD). There are nine elementary schools, one middle school and two high schools within the secondary study area. Most of these schools are located north of Market Street. The secondary study area includes five Children's Centers, which are part of the SFUSD. Children's Centers provide daycare,

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[24] San Francisco Convention and Visitors Bureau, *"San Francisco Visitors Statistics,"* 1993.

TABLE 3.4-1
SPECIFIC BUSINESSES ALONG THE EMBARCADERO CORRIDOR

ADDRESS/LOCATION	TYPE AND/OR NAME OF BUSINESS	AREA PRIMARILY SERVED
	BAY SIDE (from north to south)	
The Embarcadero at Broadway	Waterfront Restaurant	Region
Pier 5	Photo studio; electrician	Region
Pier 3	Public access to Ferryboat Santa Rosa and Pier; private offices and parking	Region
Pier 1-1/2	Private offices: architectural; electrical and Merchant Marines	Region
Pier 1	Naval architecture and parking	Region
	Restaurant: Pier 1 Deli (on south end)	Local
Pier 1/2 - North Ferry Terminal	Commuter ferry services: Tiburon, Alameda-Oakland, Harbor Bay, and Vallejo.	Region
Ferry Building	Port of San Francisco, World Trade Center, over 100 private offices, World Trade Club	Region
	Ground floor retail, cafe, bar, vendors	Local
Ferry Plaza	Restaurants and Golden Gate commuter ferry service	Region
101 The Embarcadero Agriculture Building	20 small private companies	Region
	LANDWARD SIDE (from north to south)	
Embarcadero at Broadway Golden Gateway mixed-use development	Private offices	Region
	children's daycare center, Golden Gateway Tennis and Swim Club	Local
Washington and Embarcadero	Chevron gas station and private parking lot	Local
Justin Herman Plaza/ Embarcadero Center	Hyatt Regency Hotel	Region
	small restaurants, shops and vendors on plaza	Local
Mission and Embarcadero	MUNI bus layover	Local
100 Embarcadero AÛdiffred Building	Private offices	Region
	Restaurant	Local
110/112 Embarcadero	Computer Personnel Limited and Systems Programming Limited	Region
	Provident Central Credit Union, National Automobile Club	Local
Jewish Community Federation Building	Jewish community center and museum	Local
Steuart Place Building - 132 Embarcadero/131 Steuart	San Francisco Dental Office, 38 private companies (sales, investment, marketing, public relations, attorneys, insurance)	Region
	Umberto restaurant lobby: small market, printing shop	Local
Hotel Griffon Building	Hotel Griffon	Region
	Roti Restaurant	Local
YMCA Building	Harbor Court Hotel	Region
	Embarcadero YMCA, Harry Denton's restaurant	Local
188 Embarcadero - Bayside Plaza	Over 25 private companies (publishing, law offices, financial), Taylor Made office supplies	Region
	Small cafe and market on ground floor	Local

Source: Public Affairs Management, field survey, March 1993.

nursery school, kindergarten and after-school services to neighborhood children. Only one Children's Center is located in the South of Market Area. School-aged children living in the project area generally attend schools located in adjacent neighborhoods including the Mission District and Pacific Heights. Golden Gate University, a private university oriented toward graduate level study, is located on Mission Street between First and Second Streets. Golden Gate University is attended by students from all over the Bay Area. Private childcare facilities in the primary study area are located within several office complexes, including Rincon Center, Hills Plaza and Golden Gateway Center.

Public health centers (operated by the San Francisco Department of Public Health) are located in North Beach on Mason Street and south of Market Street on Howard Street. An interim public health center is also located near the Civic Center.

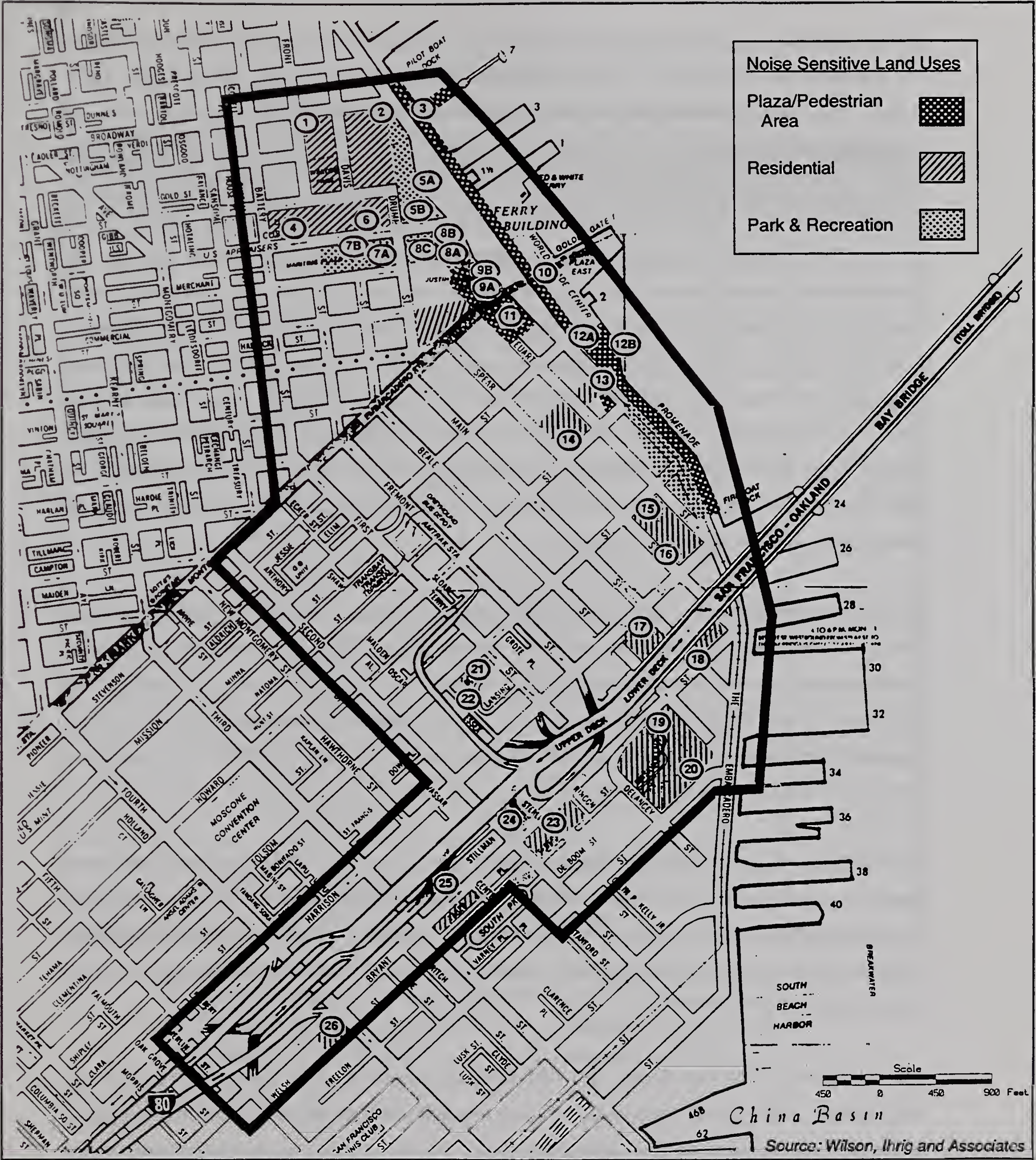
The San Francisco Public Library operates its Main Branch at the Civic Center; the Chinatown Branch on Powell Street; and the North Beach Branch on Mason Street. Other libraries in the area include those of the City College of San Francisco campuses, located in the Chinatown and Downtown neighborhoods, the Mechanics Institute Library at 57 Post Street, and Hastings Law Library at 200 McAllister Street.

Recreation facilities located within the area include neighborhood parks and squares, and open space areas and trails along the waterfront. Other parks include Telegraph Hill, Washington Square and Portsmouth Square.

There has not been a substantial change in public services from 1989 (pre-earthquake conditions) to 1992-1994 (existing conditions) as a result of the Loma Prieta Earthquake. However, during this period a number of public services throughout the City have experienced reduced funding.

3.5 NOISE

As in most major cities, the noise environment of San Francisco is dominated by motor vehicle noise, and high traffic volumes often exist in close proximity to noise sensitive land uses, such as parks, pedestrian areas and residences. The noise study area, as shown in Figure 3.5-1, runs along the San Francisco waterfront from Brannan Street north to Broadway and extends away from the Bay to include City streets linking the waterfront to parts of downtown San Francisco and streets which provide access to and from the Bay Bridge and I-80. The noise sensitive land uses in the noise study area are also indicated in Figure 3.5-1 as are the locations



Source: Wilson, Ihrig and Associates

Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Noise Study Area Land Uses and Noise Sensitive Receptors	Figure 3.5-1

of noise sensitive receptors included in this study. The noise receptors have been selected to be representative of particular areas with noise sensitive uses as indicated in Table 3.5-1. Some of the land uses have changed since the 1989 earthquake with the construction of several new residential buildings.

Pre-earthquake and existing average Ldn for all noise sensitive receptors are listed in Table 3.5-2. (See Table 4.7-2 for L_{eq} values.) The noise data demonstrates that prior to the earthquake the waterfront area and in particular the area near I-80 and the Bay Bridge were marked by high noise levels which is to be expected in a central business district with freeways in close proximity. Other portions of the study area further away from the freeways and ramp structures had noise levels that were affected by the volume of traffic on nearby local streets. After the Embarcadero Freeway was closed to traffic, noise levels in the corridor between Folsom Street and Broadway decreased a perceptible 3 dBA in most cases and as much as 11 dBA in areas that were closest to the freeway. In general, a 10 dBA decrease would be perceived as a noise that is half as loud.

Noise levels decreased in Justin Herman Plaza after the freeway closed by 9 dBA. This plaza area benefited greatly because the wall on the eastern edge of the plaza shields the plaza from noise generated on the surface roadway, but not from noise from the elevated freeway. The decrease in noise along the waters edge (e.g., Pier 7 and the Promenade) was not as large because these areas are near the surface roadway which now carries some of the traffic that previously traveled on the freeway structure.

The number of vehicles which pass Maritime Plaza today is less than 20% of the pre-earthquake volume. Consequently, the noise levels have dropped considerably with a very noticeable reduction of about 10 dBA. The noise levels at Golden Gateway Commons III did not decrease after the closing of the elevated structure because some former freeway traffic moved onto local streets in the area.

Traffic volumes on the Bay Bridge and I-80 today are similar to those before the Loma Prieta Earthquake. Thus, current noise levels for most areas affected by traffic on these roadways are similar to, if not the same as, pre-earthquake levels. The 83 L_{dn}(dBA) at the Clock Tower is due to its close proximity to both decks of the approach structure to the Bay Bridge.

TABLE 3.5-1

NOISE SENSITIVE RECEPTORS IN STUDY AREA

Receptor No.[1]	Name	CCSF Land Use Category[2]	FHWA/Caltrans Activity Category[3]	Frequent Outdoor Use
1	Golden Gateway Commons III	Residential/Commercial	B/C	--
2	Golden Gateway Commons II[4]	Residential/Commercial	B/C	--
3	Pier 7	Park	B	Y
4	Golden Gateway Center (West)	Residential	B	--
5	Golden Gateway[5]	Recreation	B	Y
6	Golden Gateway Center (East)	Residential	B	--
7	Maritime Park	Park	B	Y
8	Embarcadero Plaza (North)	Park	B	Y
9	Justin Herman Plaza	Park	B	Y
10	Ferry Building	Commercial/Office	C	--
11	Embarcadero Plaza (South)	Park	B	Y
12	Promenade	Park	B	Y
13	Harbor Court Hotel	Transient Lodging	B	--
14	Rincon Towers[6]	Residential/Commercial	B/C	--
15	Hills Bros. Plaza[6]	Residential/Office	B/C	--
16	Marin Day School[7]	School	B	Y
17	Baycrest[6]	Residential	B	--
18	Portside[6]	Residential	B	--
19	Bayside Village (Bryant)	Residential	B	--
20	Bayside Village (Brannan)	Residential	B	--
21	Guy Place (Lower)	Residential	B	--
22	Guy Place (Upper)[6]	Proposed Residential	B	--
23	355 Bryant	Residential/Office	B/C	--
24	Clock Tower[6]	Residential/Office	B/C	--
25	Apts. in first block of Stillman	Residential	B	--
26	Hotel Utah	Transient Lodging	B	--

(1) See Figure 3.5-1

(2) See CCSF Environmental Protection Element 1974

(3) See Caltrans Highway Design Manual

(4) Including Kinderhaven Day Care

(5) Tennis and Swim Club (pool and tennis courts)

(6) Construction completed after 1989

(7) Preschool and day care center

Y Frequent outdoor land use

Source: Wilson Ihrig and Associates

TABLE 3.5-2
PRE-EARTHQUAKE AND EXISTING L_{dn} NOISE LEVELS

		Average L_{dn} (dBA)	
Receptor	**Location**	**Pre-Earthquake**	**Existing**
R-1	Golden Gateway Commons III	72	72
R-2	Golden Gateway Commons II	78	72
R-3	Pier 7	72	69
R-4	Golden Gateway Center (West)	73	69
R-5A	Golden Gateway(1)	72	68
R-5B	"	71	66
R-6	Golden Gateway Center (East)	71	64
R-7A	Maritime Park	75	62
R-7B	"	72	63
R-8A	Embarcadero Plaza (North)	73	67
R-8B	"	75	73
R-8C	"	73	67
R-9A	Justin Herman Plaza	74	65
R-9B	"	76	67
R-10	Ferry Building	77	75
R-11	Embarcadero Plaza (South)	72	68
R-12A	Sidewalk near Promenade	77	75
R-12B	Promenade	75	71
R-13	Harbor Court Hotel	80	71
R-14	Rincon Towers	**	69
R-15	Hills Bros. Plaza	**	69
R-16	Marin Day School	74	74
R-17	Baycrest	**	76
R-18	Portside	**	76
R-19	Bayside Village (Bryant)	75	75
R-20	Bayside Village (Brannan)	72	72
R-21	Guy Place (Lower)	64	65
R-22	Guy Place (Upper)	§	69
R-23	355 Bryant	76	76
R-24	Clock Tower	**	83
R-25	Apartments on Stillman St.	79	77
R-26	Hotel Utah	76	77

(1) Tennis and Swim Club ** Construction completed after 1989 § Proposed project

dBA: The sound level in decibels using the A-weighting filter to approximate the frequency response of the human ear.

L_{dn}: The A-weighted energy average sound level over a 24-hour period with a 10 dBA penalty applied to sound levels between 10 p.m. and 7 a.m. A widely used single number descriptor of the sound environment at a location.

Source: Wilson Ihrig and Associates

3.6 AIR QUALITY

Air Quality Regulations And Standards

The Clean Air Act Amendment (CAAA) of 1977 (updated in 1990) established National Ambient Air Quality Standards (NAAQS) for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM_{10}). California Ambient Air Quality Standards (CAAQS) had been established for these same pollutants with the passage of the Mulford-Carrell Act of 1969. CAAQS are often more restrictive than NAAQS. Requirements for attainment of the CAAQS were made in Assembly Bill (AB) 2595, known as the California Clean Air Act of 1988, and modifications in AB 2783 (September, 1992). Table 3.6-1 lists the Federal and California Ambient Air Quality Standards (AAQS) for these pollutants. For environmental impact analyses, estimated potential pollutant concentrations associated with a proposed project are compared with the most stringent federal or state standard.

Also, as part of the air quality planning process in the Bay Area to assure compliance to the 1990 Clean Air Act Amendments (CAAA), the Metropolitan Transportation Commission (MTC) must review transportation projects to assess the impact to air quality. The MTC currently follows procedures contained within their Resolution 2270 to develop the Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP). Resolution 2270 describes the process MTC must follow to assure that the TIP and RTP conform with the 1990 Clean Air Act Amendments as well as the process that a project sponsor must follow for a project to conform with the 1990 CAAA. Recently, MTC has submitted proposed conformity procedures to the Federal Environmental Protection Agency. If approved, these procedures will supersede Resolution 2270.

Reconstruction of the Embarcadero Roadway between King Street and North Point Street is contained in the 1994 TIP (MTC 1994). The Terminal Separator Structure is programmed separately in the TIP.

The Bay Area Air Quality Management District (BAAQMD) operates air quality monitoring stations throughout the Bay Area. The monitoring station closest to the project site is at Arkansas Street and Sixteenth Street, located approximately 1 to 1-1/2 mile southwest of the Embarcadero. Data collected at this site are expected to be similar to what may occur in the project area for Ozone (O_3), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), and particulates. Table 3.6-1 lists Ambient Air Quality Standards (AAQS). Table 3.6-2 summarizes the highest

TABLE 3.6-1

STATE AND FEDERAL AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standard[1]		National Standards[2]	
		Concentration	**Bay Area Attainment Status[3]**	**Concentration[4]**	**Bay Area Attainment Status**
Photochemical Oxidants	1-hour	0.09 ppm (180 ug/m^3)	N	0.12 ppm (235 ug/m^3)	N[5]
Carbon Monoxide	8-hour	9.0 ppm (10 mg/m^3)	A	9 ppm (10 mg/m^3	Urban areas N Rural areas A
	1-hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/^{3})	A
Nitrogen Dioxide	Annual Average	—	—	0.053 ppm (100 ug/m^3)	A
	1-hour	0.25 ppm (470 ug/m^3)	A	—	—
Sulfur Dioxide	Annual Average	—	—	80 ug/m^3 (0.03 ppm)	A
	24-hour	0.04 ppm (105 ug/m^3)	A	365 ug/m^3 (0.14 ppm)	A
	1-hour	0.25 ppm (655 ug/m^3)	A	—	—
Suspended Particulate Matter (PM_{10})	Annual Arithmetic Mean	—	—	50 ug/m^3	A
	Annual Geometric Mean	30 ug/m^3	N	—	—
	24-hour	50 ug/m^3	N	150 ug/m^3	U[6]
Lead	Calendar Quarter	—	—	1.5 ug/m^3	A
	30-Day Average	1.5 ug/m^3	A	—	—

Source: BAAQMD. 1993. Prepared by D. Fairly and E. Yim. September.
BAAQMD. 1994. Personal communication with David Marshall. November 1.

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, and suspended particulate matter - PM_{10} are values that are not to be exceeded. The standards for Lake Tahoe carbon monoxide and lead are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour, or 24-hour average (i.e., all standards except for lead and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that ARB determines would occur less than once per year on the average.
2. National standards other than for ozone and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one.
3. A = Attainment. N = Nonattainment. U = Unclassified
4. National air quality standards are set at levels determined to be protective of public health with an adequate margin of safety. Each state must attain these standards no later than three years after the state's implementation plan is approved by the Environmental Protection Agency.
5. The BAAQMD has applied for attainment status for ozone. No BAAQMD monitoring station registered more than two exceedances of the federal standard in the 1990-1992 period. The EPA has accepted the Bay Area request for redesignation. Pending receipt of public comments, the Bay Area will be designated as attainment of the National Ambient Air Quality Standard for ozone.
6. The Environmental Protection Agency plans to redesignate the District nonattainment for PM_{10}

TABLE 3.6-2
AIR POLLUTANT DATA SUMMARY (1991-1993) HIGHEST MONITORED CONCENTRATIONS ARKANSAS STREET MONITORING STATION (1)

POLLUTANT	Averaging Time	YEAR 1991	YEAR 1992	YEAR 1993
Ozone		ppm (2)	ppm	ppm
	1-hour	.05	.08	.08
Carbon Monoxide (3)				
	1-hour	9	8	7
	8-hour	6.5	6.4	5.1
Nitrogen Dioxide				
	1-hour	.10	.09	.08
	Annual	.024	.022	.024
Sulfur Dioxide				
	1-hour	.04	.04	.04
	24-hour	.016	.013	.011
	Annual	.002	.002	.001
Particulate Matter (PM_{10}) (4)				
	24-hour	109	81	69
	Annual (geometric mean)	30	28	25
	Annual (arithmetic mean)	35	32	29

(1) Source: CARB, 1991, 1992, 1993.

(2) Parts per million.

(3) BAAQMD (1985, updated 1991) isopleth analyses used to more realistically represent existing CO levels than reported Arkansas Street CO concentrations.

(4) Units of measurement are micrograms per cubic meter (ug/m^3).

ambient air quality concentrations measured near the project site for the most recent three years of available data (CARB 1991, 1992, 1993).

The Bay Area is designated as "non-attainment" for Federal AAQS for carbon monoxide (CO) (urban areas) and State AAQS for ozone (O_3). The Federal EPA has designated the Bay Area as in attainment of the Federal AAQS for ozone. The Bay Area is the largest metropolitan area to achieve attainment of the Federal ozone standards, and is currently considered a "maintenance area." Monitoring data for CO for 1992 and 1993 show CO levels below the NAAQS. The BAAQMD has applied for reclassification to "attainment" of the CO NAAQS. EPA is reviewing the redesignation request. The Bay Area meets the Federal and State AAQs for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). The Bay Area is currently designated as neither in "attainment" nor "non-attainment" of NAAQS for suspended particulate matter (PM_{10}). The Environmental Protection Agency (EPA) is reviewing PM_{10} monitoring data to decide whether the Bay Area meets Federal standards. The Bay Area does not meet the California AAQS for suspended particulate matter (PM_{10}).

Air Pollutants

Motor vehicles are the main source of carbon monoxide (CO) in the San Francisco Bay Area, generating over 70 percent of CO emissions. Background CO concentrations in 1989 and 1993 for the project area were derived from BAAQMD analyses (BAAQMD 1985, updated 1991). The 1989 1-hour average CO background concentration was 9 parts per million (ppm) and the 8-hour average CO background concentration was 6 ppm. Background CO concentrations for the year 1993 were calculated to be 7.2 ppm (1-hour average) and 4.8 ppm (8-hour average). No violations in the Federal or California AAQS for carbon monoxide were measured at the Arkansas Street monitoring station during 1991, 1992 or 1993. Also, no violations of CO AAQS have been measured in the entire Air District for 1993. A comparison of the highest 1993 Arkansas Street CO measurements to the 1993 CO concentrations calculated from 1989 CO concentrations show that the 1-hour concentrations were essentially the same, and the measured 8-hour concentration was 0.3 ppm higher than the calculated concentration. A summary of pollutant data collected at the Arkansas Street monitoring station are presented in Table 3.6-2.

Ozone (O_3) is not emitted directly into the atmosphere, but is produced through complex reactions of reactive hydrocarbons and oxides of nitrogen (NO_x) with sunlight. The highest concentrations of O_3 typically occur during the summer and early autumn when the meteorological conditions are most advantageous: warm, stagnant air and strong sunshine. In the Bay Area, the highest occurrences of ozone are usually measured in the inland valleys including Santa Clara, Livermore, and Diablo. At the Arkansas Street monitor, no violations of the ozone NAAQS or CAAQS were measured during 1990, 1991, or 1992.

Oxides of nitrogen are emitted from mobile sources and stationary sources and react in the air to form nitrogen dioxide(NO_2). NO_2 and reactive organic compounds (ROC) also known as reactive hydrocarbons react with sunlight to form ozone.

Refineries and combustion of diesel fuel in truck and ships account for most of the Sulfur Dioxide (SO_2) emissions.

Exceedances of the State 24-hour and annual standards and the Federal 24-hour standard for particulate matter (PM_{10}) have been measured over the last three years at the Arkansas Street monitor. The largest source of particulates in the Bay Area is from entrained dust on paved roads.

Table 3.6-3 contains an emission inventory for San Francisco County in 1990 (BAAQMD 1993). The inventory lists all the types of pollution sources in San Francisco and the amounts of pollution associated with each source.

3.7 CLIMATE

Shadow

The elevated Embarcadero Freeway cast shadows at various times of the day and year over the entire Mid-Embarcadero corridor (including the Promenade, Justin Herman Plaza and parts of Broadway, Washington and Clay Streets). The Terminal Separator Structure cast shadows at various times of the day and year over large areas under and near the alignment, including the southern half of the three-block area bounded by Main, Folsom, First and Howard Streets, the southeast corner of the block bounded by First, Folsom, Second and Howard Streets, and one half of the block bounded by Essex, Harrison, Second and Folsom Streets. The Beale Street

TABLE 3.6-3

SAN FRANCISCO COUNTY EMISSION INVENTORY FOR 1990

Source Category	**Pollutant**						
	PM	**PM-10**	**TOG**	**ROG**	**Nox**	**SOx**	**CO**
Petroleum Process	0.0	0.0	1.3	1.2	0.0	0.0	0.0
Chemical Manufacturing Processes	10.1	6.6	7.4	2.0	0.2	0.0	0.0
Organic Compounds Evaporation	0.0	0.0	16.5	16.2	0.0	0.0	0.0
Combustion	1.1	1.0	1.2	0.6	10.7	1.0	6.5
Off-highway Mobile Source	1.0	1.0	6.1	5.6	14.4	7.9	58.2
Aircraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	2.4	1.3	28.5	26.4	17.5	1.1	170.4
Miscellaneous Emission Sources[1]	58.5	28.8	8.6	7.2	0.0	0.0	0.6
TOTAL	**73.1**	**38.7**	**69.6**	**59.2**	**42.8**	**10.0**	**235.7**

Source: BAAQMD (1993)

1 Entrained road and land dust account for 50.9 lbs of particulate (PM) AND 23.4 LBS OF PM_{10}.

on-ramp and the Main Street off-ramp cast shadows over the one-and-a-half block area bounded by Beale, Mission, and Main Streets, and the Embarcadero Freeway. The TSS connected to I-80 just south of Harrison, between First and Third Streets, contributing to the shadow cast by I-80 under and near the alignment. Long shadows during early morning and late afternoon hours were cast on the facades of buildings adjacent to the Embarcadero Freeway and the TSS. Pedestrian crossings and parking areas below the structures were in shadow during much of the mid-day hours.

The demolition of the Embarcadero freeway and the Terminal Separator Structure has eliminated shadows cast by the elevated structures and has increased the amount of sunlight in the study area. Shadows cast by I-80 and the Fremont Street off-ramps remain.

Wind

Average wind speeds and prevailing directions in San Francisco are shown in Table 3.7-1. These data are from the U.S. Weather Service weather station atop the old Federal Building at

TABLE 3.7-1
SEASONAL WIND DIRECTION FREQUENCY AND AVERAGE SPEED (Kts) IN SAN FRANCISCO

	January		April		July		October		Year	
Direction	**%**	**Speed**	**%**	**Speed**	**%**	**Speed**	**%**	**Speed**	**%**	**Speed**
N	12.5	7.9	2.2	11.0	0.3	6.0	3.3	6.6	5.0	7.2
NNE	1.3	5.6	0.7	6.1	0.3	6.8	0.7	6.6	0.8	6.0
NE	4.5	5.3	1.3	4.7	1.1	7.4	2.2	5.8	1.9	5.6
ENE	1.4	6.3	0.6	4.8	0.2	5.1	0.8	5.1	0.8	5.6
E	11.9	4.8	2.6	4.5	0.1	3.9	4.8	4.5	4.8	5.0
ESE	2.1	6.4	0.3	5.2	0.1	2.5	0.6	5.8	0.8	5.8
SE	9.1	6.4	2.4	7.8	0.2	5.0	3.7	6.6	4.2	6.8
SSE	2.8	5.6	0.3	3.8	0.1	3.0	1.3	9.0	1.2	6.4
S	6.7	5.0	4.2	7.1	1.1	4.9	4.5	7.5	4.1	6.4
SSW	1.0	4.8	0.4	4.1	0.1	3.0	1.7	12.8	0.9	8.6
SW	4.5	8.0	7.7	9.2	15.6	10.1	7.8	9.1	9.3	9.3
WSW	1.0	5.9	1.7	7.1	1.2	8.1	2.8	8.8	2.4	8.6
W	13.2	7.2	43.0	10.9	53.0	13.1	34.6	9.1	35.7	10.9
WNW	7.5	11.1	20.7	14.1	14.9	14.5	15.2	10.9	13.8	12.7
NW	11.5	7.7	9.3	10.7	10.7	11.4	10.8	8.5	10.0	9.7
NNW	1.2	5.7	0.6	10.8	0.6	8.5	0.5	7.5	0.7	8.3
CALM	7.7	—	2.1	—	0.3	—	4.6	—	3.7	—

Source: U.S. Weather Service, Donald Ballanti, Certified Consulting Meteorologist

50 United Nations Plaza during the years 1945-1950. This data base provides a good basic description of wind conditions in San Francisco, but it must be realized that significant variation in wind will occur across the city due to terrain effects and distortion of the winds by buildings. Table 3.7-1 shows that average wind speeds are greatest in the summer and least in the fall. Winds exhibit a diurnal variation with strongest winds occurring in the afternoon and lightest winds in the early morning.

Winds in San Francisco are most frequently from the west or northwest, reflecting the persistence of sea breezes. Wind direction is most variable in the winter. The approach of winter storms often results in southerly winds. Although not as frequent as westerly winds, these southerly winds are often strong. The strongest winds in San Francisco are typically from the south during the approach of a winter storm. Wind conditions partly determine pedestrian comfort on sidewalks and in other public areas. In downtown areas, high-rise buildings can redirect wind flows around buildings or divert winds downward to street level, resulting in increased wind speed and turbulence at street level.

The comfort of pedestrians varies under different conditions of sun exposure, air temperature, clothing, and wind speed. Winds up to four MPH have no noticeable effect on pedestrian comfort. With winds from four to eight MPH, wind is felt on the face. Winds from 8 to 13 MPH will disturb hair, cause clothing to flap, and extend a light flag mounted on a pole. For winds from 19 to 26 MPH, the force of the wind will be felt on the body. At 26 MPH to 34 MPH wind, umbrellas are used with difficulty, hair is blown straight, there is difficulty in walking steadily, and wind noise is unpleasant. Winds over 34 MPH increase difficulty with balance and gusts can blow people over.

The project area is located on San Francisco's eastern waterfront and south and west of Embarcadero roadway. These areas have a relatively comfortable climate compared to other areas of San Francisco for the following reasons:

- average temperatures generally increase across San Francisco from west to east due to warming of easterly-moving air across the urban landscape;
- the area sheltered from strong, cold winds coming ashore from off the Pacific or through the Golden Gate;
- the eastern portions of San Francisco are less affected by low clouds and fog compared to the western portions of San Francisco; and

- the project site is within a 'wind shadow' created by downtown high-rises.

Comfortable outdoor conditions are likely to be more frequent within these areas than most of San Francisco. This is particularly true for the southern end of the Mid-Embarcadero roadway, which is sheltered from prevailing winds by many large buildings.

3.8 TOPOGRAPHY, GEOLOGY, SOILS, AND SEISMICITY

The following section describes the affected soils/geologic environment in the project area. The 1989 baseline conditions of the soils/geologic environment were similar to the existing conditions with some changes to surface features, including the elevated Terminal Separator Structure (TSS) and the Embarcadero Freeway. Also, it appears that the fill in the project area may be slightly denser than before the Loma Prieta Earthquake because ground shaking and liquefaction during that earthquake may have resulted in densification.[25, 26]

The ground surface along The Embarcadero is essentially level at Elevation 0.[27] Ground surface slopes up to the west along the TSS alignment to approximately Elevation 19 meters (63 feet) near the intersection of Essex and Harrison streets, then drops gradually to about Elevation 2.5 meters (8 feet) near the intersection of Harrison and Sixth streets. Ground cover in the project area consists primarily of concrete sidewalks, asphalt paved roadways and parking areas, with minor grass cover in some areas.

The City and County of San Francisco lies in the Coastal Ranges geologic province of California. The Coastal Ranges province is characterized by a series of northwest trending mountain ranges and valleys. Bedrock in the project area is primarily shale and sandstone of the Franciscan Assemblage, and is covered by a variety of unconsolidated deposits and artificial fill. The project area is in a seismically active region of northern California. Although no known active faults traverse the project site, several nearby active faults could impact the project area. The active faults closest to the site are the San Andreas fault 14 kilometers (9 miles) to the west,

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[25] Chameau, J.L., G.W., Clough, F. Reyna and J.D. Frost, 1990 "Liquefaction Response of San Francisco Bayshore Fills," Geotechnical Report 90/10, Purdue University, November.

[26] Soil liquefaction is a phenomenon in which saturated (submerged), cohesionless soils experience a temporary loss of strength because of the buildup of excess pore water pressure, especially during cyclic loadings such as those induced by earthquakes. Soils most susceptible to liquefaction are loose, clean, saturated, uniformly graded, fine-grained sands.

[27] City and County of San Francisco Datum. This datum is approximately 8 feet above Mean Sea Level.

the Hayward fault 14 kilometers (9 miles) to the east, the Palo Colorado-San Gregorio fault 21 kilometers (13 miles) to the southwest, and the Calaveras fault 34 kilometers (21 miles) to the southeast. For San Francisco (including the project site), the Maximum Credible Earthquake (MCE) is considered to be an event with a Richter magnitude of 8.3 occurring on the San Andreas fault.

Soil conditions in the project area consist of artificial fill over a weak compressible clay (known locally as Bay Mud), over dense sands and stiff clays which extend down to bedrock. Along the TSS alignment the fill is 1 to 6 meters (3 to 20 feet) thick and comprises a mixture of gravel, sand, silt and clay, with varying amounts of brick fragments. The consistency of the fill ranges from very loose to very dense, and stiff to very stiff along the former TSS alignment. Along The Embarcadero, the fill is 5 to 12 meters (15 to 40 feet) thick, and is generally clean, uniformly graded sands derived primarily from sand dunes. The Embarcadero fill is typically loose to medium dense. The Bay Mud thickness along the TSS alignment varies from less than 2 meters (5 feet) to about 15 meters (50 feet). Along The Embarcadero, the Bay Mud thickness ranges between about 15 and 30 meters (50 and 100 feet).

The thickness of the dense sands and stiff clays varies from 0 to greater than 14 meters (45 feet) along the TSS alignment, and from a few inches to greater than 36 meters (120 feet) along The Embarcadero. Bedrock is exposed at the ground surface in the vicinity of Second and Harrison streets, and is as deep as 60 meters (200 feet) near the east end of the TSS alignment. Along The Embarcadero, bedrock depths range from about 23 to 75 meters (75 to 250 feet) below existing grade.

A variety of man-made subsurface features are present in the project area. These include building foundations and foundations for the demolished TSS and Embarcadero freeways, utilities, seawalls, relieving platforms (in front of the Ferry Building), and the BART tubes, the tops of which pass beneath the southern end of the Ferry Building at about 20 meters (65 feet) below existing grade.

3.9 HYDROLOGY AND WATER QUALITY

The project area is located along and near the western margin of San Francisco and includes two distinct topographic and hydrogeologic regions. The first, Segment I, includes portions of the project-area along the existing alignment of The Embarcadero and Folsom Street (between Beale Street and The Embarcadero). This segment of the project area is relatively low-lying and level and is generally underlain by thick artificial fill. Segment II of the project area includes those areas which extend southwestward from the southern end of Segment I to the western end of the project area near Sixth Street. The Segment II area slopes gently northeastward toward the Bay.

Prior to 1849, Segment I of the project area and surrounding areas were called Yerba Buena Cove, a crescent-shaped indentation of the San Francisco Bay. A seawall, composed of large rocks placed in an excavated trench and capped with concrete, was constructed to mitigate wave erosion hazards. The hydrologic and water quality conditions at the project site and within the study area were not significantly affected by the 1989 Loma Prieta Earthquake.

Only small amounts of the precipitation falling within the project site area infiltrates into the subsurface. The majority of rainfall becomes storm water runoff and flows into roof drains and inlets to the City's combined sewer system; runoff from the east side of the Embarcadero roadway currently flows directly into the Bay. The combined storm water and sewage from the project site area is conveyed by the combined sewer system to the Southeast Water Pollution Control Plant during dry weather. During wet weather (approximately 6% of the year), combined flows from the project area may also be sent to North Point Water Pollution Control Plant for treatment. Following treatment, the treated water is discharged to the Bay under Waste Discharge Requirements issued by the San Francisco Bay Regional Water Quality Control Board (RWQCB).

Runoff from paved urbanized areas, such as the study area, is recognized as a principle non-point source of pollutants contributing to water quality degradation. The pollutants carried by urban runoff include suspended sediments, heavy metals, and petroleum hydrocarbons (particularly oil and grease components).

Groundwater occurs at shallow depths, generally ranging from 1.2 -2.4 meters (4-8 feet) below the ground surface in Segment I of the study area. Groundwater occurs in this area in the heterogeneous fill materials and the underlying Bay mud. Conditions encountered during drilling of soil borings and monitoring wells indicate that the uppermost water-bearing zone is unconfined; that is, the water table can move up and down without restriction from low permeability soil layers.

Groundwater levels measured in open boreholes drilled in the central portion of Segment II of the project site were typically greater than 10.7 meters (35 feet) below the ground surface. The groundwater table was generally encountered in alluvial deposits. The greater depth to groundwater compared to that measured in Segment I is probably related to the rate of topographic rise relative to groundwater gradient westward of the filled lands along the Bay.

Groundwater quality underlying the study area has been potentially degraded by infiltration of spilled or leaked contaminants into the subsurface and contact with contaminants contained in fill materials that extend to depths below the groundwater table. Additional specific information is contained in Section 4, Environmental Consequences and Mitigation Measures, pp. 428-437.

3.10 HAZARDOUS MATERIALS

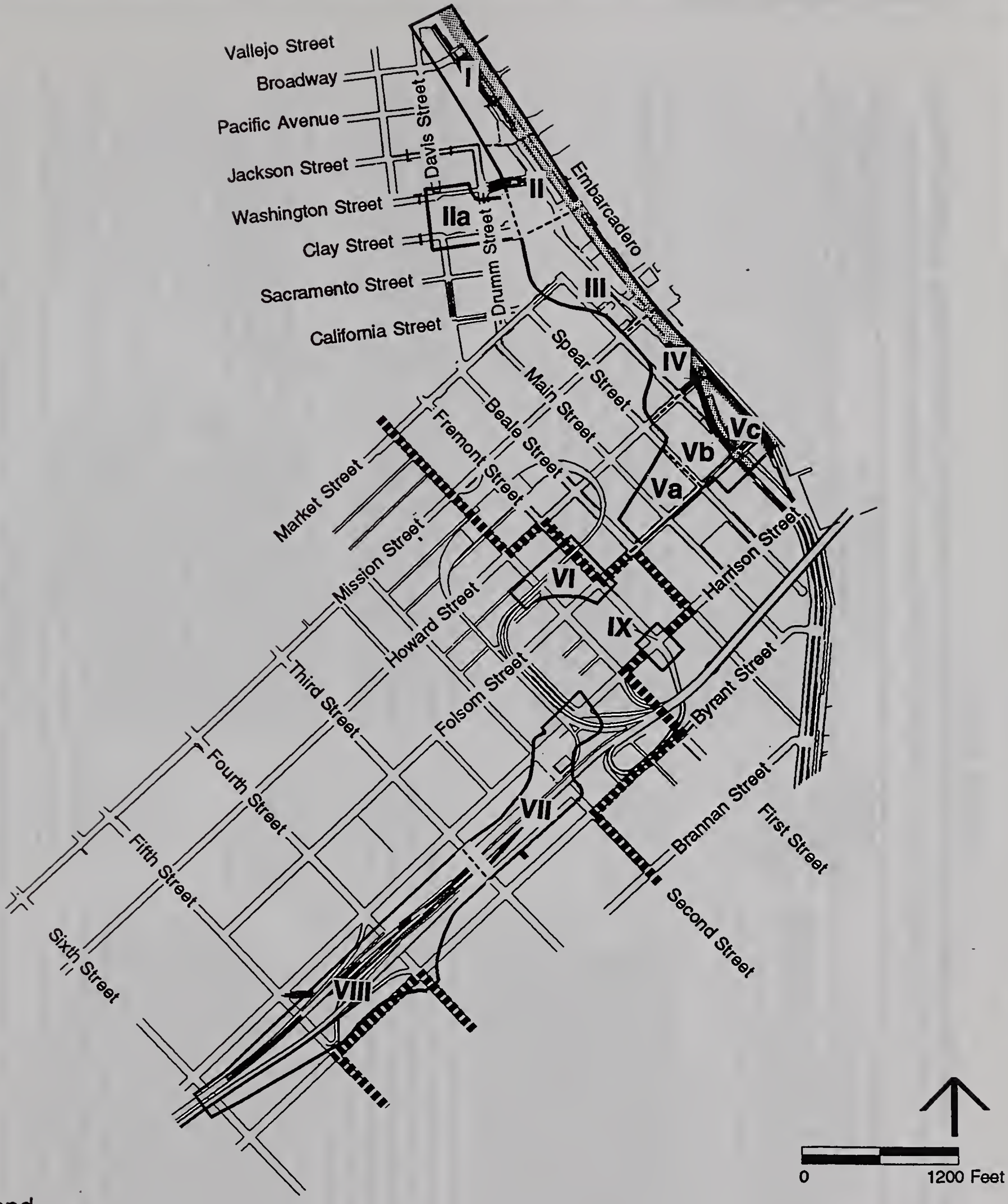
Figure 3.10-1 delineates the study area for hazardous materials assessment. Based on site history research previously conducted in the project area and soil borings from previous site investigations, a summary of historical land uses and potential and known contaminants in the study area was prepared (Table 3.10-1). In general, the primary land uses within the study area have been industrial. The potential contaminants associated with the industrial land uses include petroleum hydrocarbons, metals, polynuclear aromatic compounds, and solvents.

Soil activities from previous site investigations performed in the study area indicated the presence of a number of chemical constituents within most project subsections. Concentrations ranged from just above laboratory detection limits to above regulatory thresholds for hazardous waste determination. Additional information is contained in Section 4, Environmental Consequences and Mitigation Measures, pp 443-452.

3.11 CULTURAL RESOURCES

Cultural resources include historic buildings, structures, properties, places sites and districts, as well as historic and prehistoric archaeological sites.

The National Historic Preservation Act of 1966 (NHPA), as amended, requires Federal agencies with jurisdiction over a project to account for the effects on historic properties. Under Section 106 of the NHPA, Federal agencies such as FHWA must evaluate the effect on historic resources of any Federal, Federally-assisted, or Federally-licensed undertaking. Federal



Legend

▬	Study Area Boundary
- - - -	Division of Study Sections
▮▮▮▮▮▮	Article 20 Area Bayward of Line
▨	Shaded Area has been Reclassified from Hazardous to Non-hazardous (BASELINE, 1993a)

Source: San Francisco Municipal Code, BASELINE

92.202E & 94.060E **Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure**	DELINEATION OF STUDY AREA	Figure 3.10 -1

TABLE 3.10-1

SUMMARY OF HISTORICAL LAND USES, PREVIOUS INVESTIGATIONS, AND POTENTIAL AND KNOWN CONTAMINANTS

Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure Project, San Francisco

Location	Summary of Historical Land Uses	Potential Contaminants	Previous Subsurface Investigations	Known Contaminants In Project Area[1]
SECTION I Includes portions of AB 139, 168, 171, Piers 7, and 9	Freight sheds, boat repair shop, wood and coal storage yard, rail yard, storage for construction debris, warehouses, ferry slips	Metals, TPH, oil and grease, PNAs, solvents	Analysis of soil samples collected from three borings located within the study area during site investigation conducted along proposed project alignment; borings ER-5 and ER-6 (Dames & Moore, 1990); and boring B-41 (Camp Dresser and McKee, 1993)	Total lead >TTLC and total mercury $\geq$10 x STLC.
SECTION II Includes portions of AB 201, 202, Piers 1, 1½, and 3	Coppersmith, copper works, blacksmith, saloon, hotels, laundry, coal yards, lumber yards, paints, chemicals, oil, coal storage, Harbor Commissioner repair department, storage, wholesale garage, parking, gas station, railroad branch, freight depot, railroad yards, railroad siding, motor freight depot, office and residential complex, shopping, condominiums, tennis courts, rental car lot, offices	TPH, metals, solvents, oil and grease, PNAs	Analysis of soil samples collected from six borings drilled during site investigation conducted along proposed project alignment; borings ER-7, ER-8, ER-9 (Dames & Moore, 1990); and boring B-1, B-2, B-3 (BASELINE, 1993a)	Soluble lead >STLC; VOCs (including PNAs) detected in soils.
SECTION IIa Includes AB 202, and portions of 203	Machine shop, sausage factory, paper box manufacturer, poultry wholesaler, chemical manufacturing, library, tavern, restaurant, electric service company, plastic fabrication, printing company, pork packing, plumbing and tin ship, commercial offices, sheet metal works	Metals, TPH, solvents, PNAs, nitrates, oil and grease	Analysis of soil samples collected from five soil borings drilled during site investigation conducted at Block 202/203; borings B-4 through B-8 (BASELINE, 1993b).	Soluble lead >STLC. Total nickel >ten times STLC (detected at 1,100 mg/kg).
SECTION III Includes AB 3714, and portions of AB 233, 234, 3713, Ferry Building, and Pier 2	Warehouse, storage ship, saloons, hotel, restaurant, stables, Ferry Building, slips, storage sheds, warehouse, lumber yards, baggage and mail storage, testing laboratory, paint shop, ham and bacon curing, spice mill, coffee roasting, preserving, copper works, sheet metal works, gas station, pipe shop, forklift and truck repair, concrete viaduct, bus parking, auto parking, housing complex, auto service, stevedores equipment storage office, fire department office, park, ship chandlery, oil and tar, post office, drug store, candy store, tin shop, MUNI bus turnaround, loading area, office building, parking, railroad	Nitrates, oil and grease, metals, PNAs, TPH, solvents	Analysis of soil samples collected from nine borings located within study area during site investigations conducted: along proposed project alignment, borings ER-10 and ER-11 (Dames & Moore, 1990); for MUNI Metro Turnaround Project covering project alignment along Embarcadero between Market and Folsom streets, borings MMT-5, MMT-6, MMT-7, and MMT-8 (Geo/Resource Consultants, Inc., 1991d); as part of waste classification evaluation for MUNI Metro Turnaround Project, borings B-8, B-11, and B-16 (Harding Lawson, 1992).	Soluble lead >STLC; Soluble copper $\geq$ STLC; Total mercury $\geq$10 x STLC; Total lead >10 x STLC; VOCs (including PNAs) detected in soils.

CONTINUED...

TABLE 3.10-1 (continued)
SUMMARY OF HISTORICAL LAND USES, PREVIOUS INVESTIGATIONS, AND POTENTIAL AND KNOWN CONTAMINANTS
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure Project, San Francisco

Location	Summary of Historical Land Uses	Potential Contaminants	Previous Subsurface Investigations	Known Contaminants In Project Area[1]
SECTION IV Includes AB 3715, and portions of AB 3716	Coal yard, coal refining, coal bunker, storage, tool house, tramway, lumber yards, saloons, restaurant, boarding houses, hotels, grocery store, barber, tailor, shipwright, ship chandler, pool hall, pawn shop, machine shops, four 40-gallon storage tanks, auto repair, warehouses, freight shop, storage, stevedore equipment ware-houses, repair shop, electronic equipment manufacturing, office buildings, parking, dental offices	TPH, metals, PNAs, solvents, oil and grease	Analysis of soil samples collected from 14 borings located within the study area during site investigations conducted: along proposed project alignment, borings ER-12 and ER-13 (Dames & Moore, 1990); for MUNI Metro Turnaround Project, borings MMT-9D and MMT-11 (Geo/Resource Consultants, Inc. 1991d); as part of waste classification evaluation for MUNI Metro Turnaround Project, borings B-1, B-2, B-3, B-4, B-5, B-12, B-13, B-15, B-17, and B-22 (Harding Lawson, 1992).	Soluble lead >STLC and >Federal threshold; Total mercury >10 x STLC; Total lead >10 x STLC; VOCs (including PNAs) detected in soils; Percent asbestos ≥California threshold for friable asbestos.
SECTION V Includes AB 3742, and portions of AB 3739, 3740, 3741, 3743, and 3744.	Lumber yards, iron works, foundry, blacksmith, shipwright, ship rigger, shipsmith, coal yard, boiler house, coal bunker, storage, tramway, refining, storage sheds, saloons, restaurant, boarding house, grain and/or hay barn, police station, fire extinguisher shop, electric light company, oil sheds, railway, freight depot, plumbing and sheet metal works, machine shops, boat building, boat repair, electronic equipment manufacturing, auto, truck, freight depot, spur storage, parking, truck repair, truck yard, dry ice manufacturing, gas and oil, lawn mower repair, stevedores equipment storage and repair shop, motorcycle service, smelting and refining of scrap metal, fuel company, fireboat, fire station, metal smelting and refining, wholesale coffee, tea, spices, diesel generator, wrecking yard, condominiums.	TPH, metals, PNAs, oil and grease, solvents	Analysis of selected soil samples collected from 40 borings during site investigations conducted: (Harding Lawson, 1992); at 200 Embarcadero (AB 3742), borings 200-1 and 200-3 (Geo/Resource Consultants, Inc., 1991a); at 240 Embarcadero (AB 3742), borings 240-1, 240-4, and 240-5 (Geo/Resource Consultants, Inc., 1991b); at 260 Embarcadero (AB 3742), borings 260-1, 260-2, 260-3, 260-4, 260-5, 260-6, 260-7, 260-8, 260-9, 260-10, and 260-11 (Geo/Resource Consultants, Inc. 1991c); at west corner of Steuart and Folsom streets (AB 3741), borings FB-A, FB-B, FB-C, FB-D, FB-E, FB-F (BASELINE, 1992a) and A, B, C, D, E, F, G, H, I, B-W-1B, G-W-1, G-S-1, and G-E-1 (BASELINE, 1992b); at southeast corner of Main and Folsom streets (AB3739), borings BM0-L32, E-U33, and E-L32 (TRC, 1992).	Total lead >TTLC; Soluble lead >STLC and >Federal threshold; Total copper ≥10x STLC; Total mercury >10 x STLC; VOCs (including PNAs) detected in soils.
SECTION VI Includes portions of AB 3736, 3737, 3738, 3747, and 3748.	Chemical manufacturing (white lead paint), brass foundry, printing shop, gas works, warehouse, machine shop, ink factory, sheet metal works, pipe manufacturing, gasoline station, brewery, smelting, ironworks, food processing	Metals, PNAs, solvents, volatile organics, oil and grease, petroleum hydrocarbons	Analysis of soil samples from 20 borings drilled during terminal separator site investigation; borings M0-L27, E-U28L, E-U28M, E-U28R, E-U29L, E-U29M, E-U29R, M0-L28, E-L28L, E-L28R, BB0-U29, BM0-L28 (TRC, 1992); borings B4 through B-11 (Nations, 1992).	Three samples contained petroleum hydrocarbon >1,000 ppm; no VOCs detected in samples; semi-volatile compounds detected in several samples. Samples contained total lead, copper, and arsenic in concentrations >10 times STLC. Soluble lead >STLC.

CONTINUED...

TABLE 3.10-1 (continued)
SUMMARY OF HISTORICAL LAND USES, PREVIOUS INVESTIGATIONS, AND POTENTIAL AND KNOWN CONTAMINANTS
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure Project, San Francisco

Location	Summary of Historical Land Uses	Potential Contaminants	Previous Subsurface Investigations	Known Contaminants in Project Area[1]
SECTION VII Includes portions of AB 3749, 3763, and 3764.	Warehouse, food processing, sheet metal works, gasoline station, wholesale chemical company, machine shop, printing shop, lithography and ink compounds, paint and lubricating oil warehouse, steel and wire manufacturing, electric substation, wine and liquor warehouses.	Metals, PNAs, solvents, petroleum hydrocarbons, oil and grease	Analysis of two soil samples collected at depths of 1.5 and 3 meters (5 and 10 feet) from one boring location; boring E-U14 (TRC, 1992).	Hydrocarbons were not detected; no VOCs or semi-VOCs were detected in either sample. Metals detected at concentrations below threshold levels.
SECTION VIII Includes portions of AB 3760, 3761, and 3762.	Machine shop, chemical plant, rubber works, auto body factory, oil warehouse, sheet metal works, gasoline station, truck assembly plant, printing plant, printing factory, bus terminal, coffee & tea mill, furniture warehouse, wholesale drug company, battery company	Metals, PNAs, petroleum hydrocarbons, solvents	Analysis of soil samples collected from seven boring locations drilled during terminal separator site investigation; borings E-U13, E-U12, E-U11, E-U9L, E-U9R, E-U8L, E-U8R (TRC, 1992).	Total hydrocarbons detected in three samples (E-U9R, E-U13, E-U12) at concentrations of 174, 3,085, and 8,725 ppm, respectively. No VOCs or semi-VOCs detected in any of the samples. Total lead >10 times STLC in samples collected from three of the seven borings. Soluble lead >STLC in two of the three samples.
SECTION IX Includes portions of AB 3747, 3748, 3765, and 3766	White lead manufacturing, residential foundry, lumber storage, machine shop, gasoline station, parking, and commercial offices.	Metals, PNAs, petroleum hydrocarbons, solvents	No subsurface investigations available.	N/A.

Sources: Bechtel Environmental, Inc., and Geo/Resource Consultants, Inc. 1989, Olmsted, et al., 1977; Harding Lawson Associates, 1988, 1989 and 1992; Geo/Resource Consultants, Inc., 1991a, 1991b; 1991c; 1991d; Dames & Moore, 1990; BASELINE, 1992a, 1992b; Resource Consultants, 1992.

Notes: Refer to Figure 3.10-1 for section locations.
AB = Assessor's Block.
PNAs = Polynuclear Aromatic Hydrocarbons.
VOC = Volatile Organic Compound.
TPH = Total Petroleum Hydrocarbons.
STLC = Soluble Threshold Limit Concentration.
TTLC = Total Threshold Limit Concentration.
> = Greater than.
≥ = Greater than or equal to.

Contaminants indicated include only those identified at concentrations exceeding or potentially exceeding regulatory criteria for hazardous waste. Contaminants shown were identified in subsurface fill material.

agencies are required to present the Advisory Council on Historic Preservation (ACHP) an opportunity to review and comment on the effects of proposed actions on historic properties.

The Section 106 process involves identifying historic properties listed on the National Register of Historic Places or those found to meet National Register eligibility criteria, and working with the State Historic Preservation Officer (SHPO) to determine the effect of proposed action on the property. When an impact may occur, this process is typically concluded with a Memorandum of Agreement (MOA) signed by the consulting parties, which stipulates the measures to be taken in order to reduce or eliminate any adverse effects.

The Section 106 process requires that all historic and archaeological properties within agreed upon Areas of Potential Effect (APE) be documented in a Historic Property Survey Report (HPSR). An HPSR and Evaluation of effects was prepared for this project and submitted to the State Historic Preservation Office (SHPO) for concurrence. The letter of concurrence from SHPO is included in the Comments and Coordination section of this EIS/EIR.

The HPSR and Evaluation of Effects are on file and available for public review at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

3.11.1 HISTORIC ARCHITECTURAL RESOURCES

In accordance with the Section 106 process, the HPSR and Evaluation of Effects identified seven properties within the Area of Potential Effect (APE) for historic architectural resources that are in the National Register of Historic Places (National Register); four properties, including theSan Francisco-Oakland Bay Bridge, that have previously been determined eligible for the National Register; and 25 properties and a portion of one historic district that appear eligible for inclusion in the National Register. (See Figure 3.11-1 for the location of these resources.)

The APE for historic architectural resources also contains a number of buildings and districts locally designated under Articles 10 or 11 of the City Planning Code, buildings listed on the California Register, and buildings listed in previous inventories of the area. Table 3.11-1 contains all available ratings or designations for buildings in the area including those developed through local surveys.

The San Francisco Department of City Planning conducted a citywide inventory of architecturally significant buildings from 1974 to 1976. The inventory assessed the architectural significance of

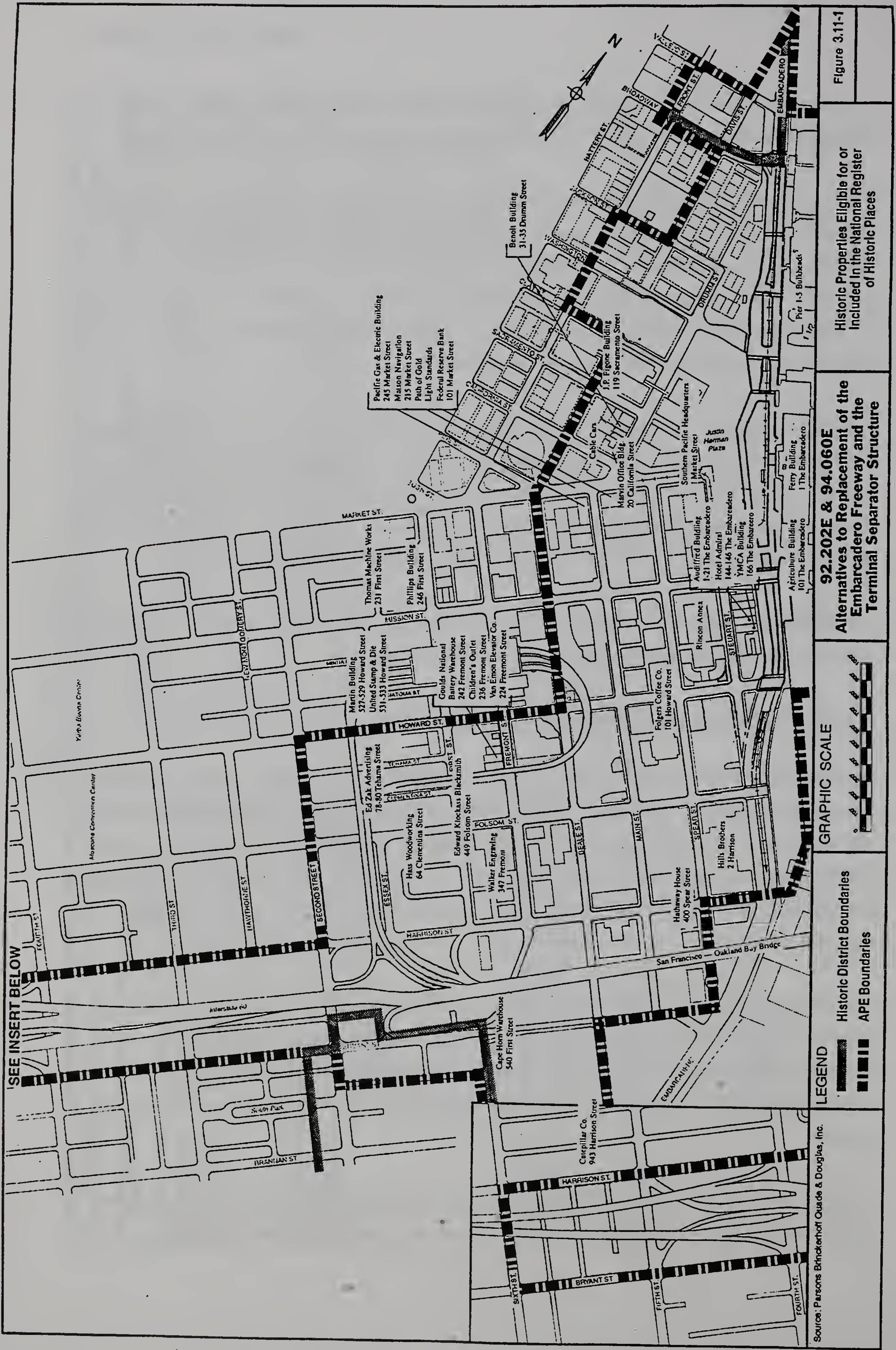


Figure 3.11-1

Historic Properties Eligible for or Included in the National Register of Historic Places

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

GRAPHIC SCALE

LEGEND

▨ Historic District Boundaries

▬ APE Boundaries

Source: Parsons Brinckerhoff Quade & Douglas, Inc.

TABLE 3.11-1
ARCHITECTURALLY AND/OR HISTORICALLY RATED BUILDINGS WITHIN THE APE FOR HISTORIC ARCHITECTURAL RESOURCES

Location	Building Name	National Register	California Register	Article 10		Article 11/ Downtown Plan	1976 DCP Survey	Heritage Survey	UMB Survey
				Designated Landmarks	Historic Districts[1]				
138/1					NEWF incompatible[2]				
139/1	Victoria Station				NEWF incompatible[2]				
755 Davis Street	Albers Milling Building				NEWF compatible[2]				
60-70 Broadway	United Seed Building				NEWF compatible[2]				
140/6	gas station/vacant				NEWF incompatible[2]				
500 Beale	Postal Substation						1		
327 Bryant Street					NCSE				yes
355 Bryant Street					CASE			C	yes
398 Bryant Street									yes
460 Bryant Street								C	yes
462 Bryant Street								C	yes
562 Bryant Street									yes
564 Bryant Street									yes
570 Bryant Street									yes
20 California Street	Marvin Office Bldg.	PE[4]				II	1	B	
64 Clementina Street	Haas Woodworking	PE							
17-21 Drumm Street	Planteen & Krough					II	1	C	yes
23-29 Drumm Street	Men's Warehouse					II	1	C	yes
31-35 Drumm Street	Benoit Building	PE				III	1	B	yes
5 Embarcadero Center	Hyatt Hotel						3		
The Embarcadero	Pier 1-5 Bulkheads	PE					1		
1 The Embarcadero	Ferry Bldg.	Listed	Listed	#90			5	A	
1-21 The Embarcadero	Audiffred Bldg.	Listed	Listed	#7		I	3		
101 The Embarcadero	Agriculture Bldg.	Listed	Listed				2	A	
144-146 The Embarcadero	Hotel Admiral	PE							no
166 The Embarcadero	YMCA	Listed				II	1		
480 Fifth Street							1		
484 Fifth Street							1		
201 First Street						V		D	yes
206 First Street						V		C	yes
220 First Street						V		C	yes
221 First Street						V		D	yes
231 First Street	Thomson Machine Works	PE				I		B	yes
234 First Street at Tehama	Phillips					I	1		
237 First Street	California Ink Factory					V	1	C	yes
246 First Street	Phillips Bldg.	PE					1		
425 First Street	Union Oil Co. Bldg.						4		
540 First Street	Cape Horn Warehouse	E			CSE		1	C	yes
90 Folsom Street							1		
401 Folsom Street							0		
443 Folsom Street		PE					1		
449 Folsom Street	Edwin Klockars Blacksmith	PE		#149					
501 Folsom Street at First							2		
530 Folsom Street						V		B	yes
572 Folsom Street						V		B	yes
425 Fourth Street									yes
224 Fremont Street	Van Emon Elevator Co.	PE				V		C	
236 Fremont Street	Children's Outlet					V			yes
242 Fremont Street	Gould National Battery Warehouse					V	0	C	yes
244 Fremont Street						V	0	C	yes

CONTINUED...

TABLE 3.11-1 (continued)
ARCHITECTURALLY AND/OR HISTORICALLY RATED BUILDINGS WITHIN THE APE FOR HISTORIC ARCHITECTURAL RESOURCES

Location	Building Name	National Register	California Register	Article 10		Article 11/ Downtown Plan	1976 DCP Survey	Heritage Survey	UMB Survey
				Designated Landmarks	Historic Districts[1]				
347 Fremont Street	Walker Engraving	PE					1		
355 Fremont Street							1		
2 Harrison Street	Hills Brothers	E					4		
101 Harrison Street							3	B	yes
450 Harrison Street							4		
645 Harrison Street							2		
677 Harrison Street									yes
735 Harrison Street								C	yes
943 Harrison Street	Caterpillar Co.	PE							
101 Howard Street	Folger Coffee Co.	PE				I	2	A	
501 Howard Street						V	0	C	yes
527-529 Howard Street	Martin Bldg.	PE				V		C	yes
531-533 Howard Street	United Stamp & Die	PE				V		C	yes
547 Howard Street						V		C	yes
579 Howard Street						V		C	yes
583 Howard Street						V		C	yes
589 Howard Street						V		C	yes
75 Lansing Street							1		
66/76 Lansing Street							2		
201 Main Street							2		
1 Market Street	Southern Pacific Hdqtrs.	PE				I	4	A	
Market at California	Cable Cars	Listed	Listed					A	
1 to 2490 Market Street	Path of Gold Light Standards	PE		#200				A	
San Francisco Bay	San Francisco-Oakland Bay Bridge	E							
101 Market Street	Federal Reserve Bank						2		
215 Market Street	Matson Navigation	Listed	Listed			I	4	A	
245 Market Street	PG&E Bldg.	Listed	Listed			I	4	A	
100 Mission Street							1		
Mission at Spear	Rincon Annex	Listed	Listed	#107			3	A	
101 Mission Street							1		
103-111 Mission Street							1		
119 Sacramento Street	J.P. Figone Bldg.					V	3	C	yes
205 Second Street						V		C	yes
217 Second Street						V	0	C	yes
333 Second Street							2		
461 Second Street					CSE			B	yes
70-72 Spear Street							1		
124-134 Spear Street							1	C	
200 Spear Street							2		
400 Spear Street	Hathaway Warehouse	PE							
240-242 Steuart Street	Seaman's Institute						1		
35 Stillman									yes
78-80 Tehama	Ed Zak Advertising					V		C	yes
10 Tenny Place						V			yes
428 Third Street									yes

1. Designations used in this category include: NEWF (Northeast Waterfront), CSE (Contributory-South End), NCSE (Non-contributory-South End), and CASE (Contributory-altered South End).
2. Assessor Blocks 139 and 140 are located in the southeast portion of the Northeast Waterfront (NEWF) Historic District, which includes historically and architecturally significant buildings dating from the 1850s to the present century.
3. Buildings identified in the UMB Survey as having historic importance are noted in the table by the word *yes*, while those identified in the survey as not having historic importance are noted in the table by the word *no*.
4. There are three categories under the National Register of Historic Places: Listed; Eligible for listing (shown as E in the table); and Potentially Eligible for listing (shown as PE in the table).

10,000 surveyed structures citywide from the standpoint of overall design and particular design features. Both contemporary and older buildings were included and each building was numerically rated according to its overall architectural significance. The ratings range from a low of "0" to a high of "5." According to inventory participants, buildings rated "3" or higher represent approximately the best two percent of the City's architecture. 50 buildings within the APE were identified in the survey.

The Foundation for San Francisco's Architectural Heritage (Heritage) has undertaken architectural resources surveys of many parts of San Francisco including the vicinity of the subject site. Summary ratings assigned range from "A" to "D," and were assigned based on architectural significance, historic context, and negative alterations. Forty-three buildings within the APE have been rated by Heritage.

The Department of City Planning's 1990 Unreinforced Masonry Buildings (UMB) Survey listed previously assigned survey ratings for unreinforced masonry structures citywide. Previously unrated buildings were evaluated using National Register criteria, and some have been determined to appear eligible for National Register listing.

The California Register was created in September 1992 to be the definitive listing of historic resources in the State. The California Register encompasses all historic properties currently listed in the National Register, or officially determined eligible for the National Register. The California Register also includes California Historic Landmarks, and may include properties identified in historic surveys, and locally designated historic properties. To date, the SHPO has not released regulations implementing the California Register.

Historic architectural resources surveys were performed prior to adoption of several elements of the San Francisco Master Plan which include or abut portions of the APE. As a result, these elements, including the Downtown Plan, South of Market, and the Northeast Waterfront, recognize and list buildings and districts of note. Generally, these structures or districts are identified as worthy of retention, and/or worthy of future study and potential designation. In some cases, structures and districts identified in Master Plan elements are also afforded protection under Article 10 or Article 11 of the City Planning Code.

The purpose of Article 10 of the City Planning Code is to protect and enhance the use of sites and areas of importance in local, state or national history; which provide significant examples of architectural styles of the past; or which are unique and irreplaceable to the City. Article 10 contains procedures and criteria for designation of local landmarks and historic districts, procedures and criteria for consideration of proposals to alter or demolish landmarks and buildings within historic districts, and a list of designated landmarks and historic districts. Five landmarks and portions of two historic districts are located in the project area.

The purpose of Article 11 of the City Planning Code is to protect, enhance and perpetuate buildings and definable sub-areas of special architectural, historical, and aesthetic interest in the C-3 districts, and sets forth the rules governing the use of Transferable Development Rights (TDRs) intended to facilitate the retention of significant and contributory buildings.

3.11.2 ARCHAEOLOGICAL RESOURCES

The Area of Potential Effect (APE) for archaeological resources is smaller than the APE for historic architectural resources, and contains only areas where ground disturbance would occur as part of one or more of the project alternatives. Generally, the APE for archaeological resources extends along the Embarcadero Roadway between Broadway and Folsom Street, onto Assessor's Blocks 202 and 203, where ramps to and from the Embarcadero Freeway were located, and along the I-80 Freeway, including areas where the TSS was located.

Archaeological investigations to date have included formal records searches of previously recorded prehistoric and historic resources within the APE for archaeological resources. The resources of the Northwest Information Center at Sonoma State University, the Bancroft Library at the University of California in Berkeley, the San Francisco Maritime Museum Library, and the California Historical Society were also consulted, and a field review of the project area was conducted. Substantial previous research was conducted for the 1993 Terminal Separator Structure/SF 480 Rebuild project before it was merged with the Mid-Embarcadero Roadway Replacement project (Praetzellis et al., 1993). Known archaeological resources of significance within the APE include the old seawall, which has previously been determined eligible for the National Register.

Potential archaeological resources that may be encountered during construction activities within the project area would vary in type, degree of potential integrity, and potential significance based on National Register criteria. Many of the potential archaeological resources identified in the project area are closely associated with the Gold Rush Period (1848-1857) and City Building

Period-Late Nineteenth Century (1858-1906) of San Francisco, particularly on the eastern waterfront. The following is a brief overview of potential archaeological resources and a discussion of their potential significance. Extended analysis is provided in the Archaeological Survey Report (ASR) prepared for the project, a part of the Historic Properties Survey Report (HPSR), which is on file and available for public review at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

One potential archaeological site, CA-SFr-2, was previously recorded at Third and Harrison Streets. The site appears to be an "intact" habitation with shell mitten, artifacts, and burials. In addition, it is possible that previously undocumented prehistoric sites may be present anywhere in the project area that had been dry land or marshy shallows in prehistoric times. Any such prehistoric site would have high potential research value and might be eligible for the National Register of Historic Places.

Much of the project APE remained under water during the Spanish/Mexican/Early American Periods (ca. 1770-1848), and the area of Rincon Hill is not known to have been occupied or extensively used during these periods. No known buried hulks or other artifacts are known to have been recovered from or near the project APE from this period. However, it is remotely possible that stray artifacts were discarded or lost on Rincon Hill or during boat transit across Yerba Buena Cove. It is also remotely possible that unrecorded sunken small boats from this period may be present at undetermined locations. If present, such resources would be of some interest to historic archaeologists. However, the eligibility of such small craft for nomination to the National Register of Historic Places is undetermined at this time.

After the discovery of gold in California in 1848, there was a marked increase in the population along the eastern waterfront of San Francisco, and a swift rise in the level of commercial and port-related activities. To accommodate this rapid development, nineteenth-century San Francisco expanded outward into the what was then Yerba Buena Cove, Through intensive and haphazard landfilling, the construction of wharves also began in 1848 to serve the growing shipping and commerce industries. These wharves provided access to docked vessels and to the businesses and warehouses that were built on wharf pilings. During this period, water lots were claimed and improved by piling, in-filling, and at least initially, by scuttling old ships to serve as markers. By 1850, over five hundred abandoned vessels were afloat in Yerba Buena Cove. Some were sold and put back in service, others were modified to served as storeships (warehouses), lodging houses, and stores along the docks. Most were eventually hauled to Rincon Point for disposal.

The potential significance of the Gold Rush Period wharves of San Francisco has never been evaluated. Although only pilings are likely to remain from the wharves after removal of the walkways and fill, these may be eligible for the National Register. Though there are no precedents for this in San Francisco. Refuse and associated artifacts, discarded spoiled merchandise, ship fittings, and other similar artifacts, may be present and buried under later fill and could provide insights into wharf activities. Such deposits may have suspect provenance or may be mixed with later refuse and fill materials; consequently, the integrity of such deposits may be suspect.

By the late Nineteenth Century major filling had taken place in Yerba Buena Cove, and expansion of the South of Market area had been extended nearly to the alignment of the modern Embarcadero. Construction of San Francisco's first seawall began in 1867, and its second seawall, begun in 1878, was not completed until 1924.

Archival research indicates that a number of buried archaeological resources from the Gold Rush and City Building Period (ca. 1848-1906) may be located within the project APE. The types of resources that may be present include: storeships and other hulks; buried wharves; the Sea Walls; buried debris from industrial sites; building remains and debris from commercial buildings and sites; buried remains and debris from domestic/residential sites; buried remains and debris from institutions; and artifacts and other refuse contained in historic fill deposits. Each of these categories of potential archaeological resources are listed below with a brief description of their potential significance under National Register criteria.

Buried Storeships and Other Hulks

- The Roma (1850s)
- The Elizabeth (1850s)
- The Cordova (1850s)
- The Bethel (1850s)
- The Garnet (1850s)
- The Alida (1850s)
- Ship D (1850s) (AB 3739)
- Storeship C (1850s-post 1864) (AB 3718)
- Ship B (1850s-ca.1857) (AB 3739)
- Ships Hare's Shipbreaking Operation (1850s)

Evaluation of the potential significance of buried ships' hulks depends on their condition and history. All scuttled ships had been stripped of cargo and fittings prior to sinking, yet several such buried ships in San Francisco have been judged eligible for nomination to and placed on the National Register of Historic Places.

Wharves

- Washington Street Wharf (1850s-1860s)
- Clay Street Wharf (1850s-1860s)
- Pacific Street Wharf (1850s-1860s)
- Commercial Street Wharf (1850s-1860s)
- Market Street Wharf (1850s-1860s)
- East Street (1850s-1860s)
- Steuart Street Wharf (1850s-1870s)
- Main Street Wharf (1854-late 1860s)

The potential significance of the Gold Rush Wharves of San Francisco has never been evaluated. Although only pilings are likely to remain from the wharves after removal of the walkways and filling in, these may be eligible for the National Register, but there are no precedents in San Francisco.

The Seawalls

- The Old Sea Wall (1867-1870s)
- The New Sea Wall (1878-1924)

The Old Sea Wall has been determined to be eligible for nomination to the National Register of Historic Places (Gualtieri 1988). The New Sea Wall is eligible as well.

Industrial Sites

- Life C Watts Shipyard (1850s-1867) (AB 3739)
- Risdon Ironworks (1868-1899) (AB 3739)
- Industrial Ironworks (late 1860s-1906) (AB 3739)
- Western Foundry (1880s-1906) (AB 3737)
- Golden State Miners' Ironworks (1860-1906) (AB 3737)
- Chinese Cigar Box Factory at 626 Bryant Street (1870s?/80s-1906) (AB 3761)
- West Coast Furniture Factory 456-493 Fourth Street (1870s?/80s-1906)(AB 3761)
- Weston Basket Factory at 652-654 Bryant Street (1890s-1906) (AB 3761)
- Blacksmith/Cooper/Furniture shops at 658, 658 1/2 Bryant Street (1870s?/80s-1906) (AB 3761)

- Western Matza Company at 433 Sixth Street (1880s-1906)(AB 3760)
- Sonoma Preserve Company at 424-426 1/2 Fifth Street (1880s-1906) (AB 3760)
- Reed Pickle Factory at 718-718 1/2 Bryant Street (1890s-1906)(AB 3760)
- Undocumented small factories in AB 202/203
- Undocumented small factories in Mid-Embarcadero Area

These sites, if they display integrity, would likely be eligible for nomination to the National Register of Historic Places, under the theme of industrialization and innovation. Several, such as the Risdon Ironworks may also qualify under Criterion A as a reflection of early settlement and industry in San Francisco. The Watts Shipyard might qualify for nomination to the National Register of Historic Places as an example of an early workshop during the Gold Rush that might throw light on boat building and repairs conducted during the first years of the City. The eligibility of the smaller workshops and factories is uncertain at this time.

Commercial Buildings/Sites

- Residential/commercial buildings and outbuildings at 308 and 308 1/2 Folsom (1870s-1906) (AB 3738)
- Residential/commercial buildings and outbuildings at 310 and 312 Folsom (1880s-1906) (AB 3738)
- Miners' Hotel and surrounding shops 261 and 263 First Street, 432-418 Folsom Street (1855-1906) (AB 3737)
- Residential/commercial buildings at corner of Folsom and Fremont Streets, 404-408 Folsom, 242-248 Fremont (1860s-1906) (AB 3737)
- Rincon House 268-272 First (1854-1906) (AB 3736)
- Shops with residences 256-266 First Street (1870s-1906) (AB 3736)
- Stores at 405-422, 424-430 Fourth Street (1870s?/80s-1906) (AB 3761)
- Saloons at 400, 404, and 422 Fourth Street (1880s?/1890s-1906) (AB 3761)
- Saloons at 401, 413, 449 Fifth Street (1880s?/1890s-1906)(AB 3761)
- The New 4th Street Hotel at 203-205 Perry Street (1870s?/80s-1906) (AB 3761)
- Chinese laundries at 807 Harrison Street (1880s) (AB 3761)

- Chinese laundry at 817 Harrison Street (1890s-1906) (AB 3761)
- Chinese laundry at 220 Perry Street (1880s) (AB 3761)
- Chinese laundry at 421 Fifth Street (1880s) (AB 3761)
- Western Transfer & Storage Company's stables at 837 Harrison Street (1890s-1906) (AB 3761)
- Stetson Renner Drayage Company's stables/Rode and Company's truck stables at 423-435 Fifth Street (1890s-1906) (AB 3761)
- Wood and coal store rear of 855-857 Harrison Street (1890s-1906) (AB 3761)
- Cobbler's residence at 923-923 1/2 Harrison Street (1890s-1906) (AB 3760)
- Saloons at 400-402, 422, and 448 Fifth Street (1870s?/1880s-1906) (AB 3760)
- Saloons/stores at 910, 955, 971, 973-975 Harrison Street (1870s?/80s-1906) (AB 3760)
- Saloon/store at 762-764 Bryant Street (1870s?/1880s-1906) (AB 3760)
- Saloon/store at 445 Sixth Street (1870s?/1880s-1906) (AB 3760)
- Stores at 404, 408-414, 440-444 Fifth Street (1870s?/1880s-1906) (AB 3760)
- Stores at 907-913 and 917 Harrison Street (1870s?/1880s-1906) (AB 3760)
- Stores at 403-405, 431, and 435-443 Sixth Street (1870s?/1880s-1906) (AB 3760)
- Drug store at 401 Sixth Street (1870s?/1880s-1906) (AB 3760)
- Wood and coal yard at 404 Fifth Street (1880s-1906) (AB 3760)
- Wood and coal yard at 5 Oak Grove Avenue (1870s?/1880s-1906) (AB 3760)
- Hay barn at 430 Fifth Street (1880s-1906) (AB 3760)
- Hay barn at 413 Sixth Street (1890s-1906) (AB 3760)
- Milk depot at 408 Fifth Street (1890s-1906) (AB 3760)
- Undocumented commercial sites on AB 202/203
- Undocumented commercial sites in Mid-Embarcadero Area

Commercial sites would most likely meet Criterion D for eligibility for nomination to the National Register of Historic Places. Domestic and commercial sites tend to overlap or are coincident.

Shops frequently occur on the ground floor over which lodging or rooms were located. Owners or workers of commercial enterprises frequently lived on the premises or above them. Thus refuse, trash pits, privies, etc. of commercial establishments may be next to, overlap, or be mixed with, habitation refuse and deposits. The data that might be associated with the Chinese laundries might qualify as documentation of this significant ethnic group. As most of the area burned in the 1906 fire, contents of commercial establishments may survive in sufficient amounts and integrity to permit research.

Domestic/Residential Buildings

- Life C. Watts Shipyard (1850s-ca.1867) (AB 3739)
- Residential/commercial buildings and outbuildings at 308 and 308 1/2 Folsom (1870s-1906) (AB 3738)
- Residential/commercial buildings at 310 and 312 Folsom (1880s-1906) (AB 3738)
- Rental units at 314-324, 243-239 Folsom, 1-3 Lincoln (1880s-1906) (AB 3738)
- Miners' Hotel 261 First and surrounding shops at 263 First and 432-418 Folsom Street (1855-1906) (AB 3737)
- Residential/commercial buildings at corner of Folsom and Fremont Streets, 404-408 Folsom, and 242-248 Fremont (1860s-1906) (AB 3737)
- Residential buildings at 238 Fremont and on Baldwin Court (1880s-1906) (AB 3737)
- Rincon House 268-272 First (1854-1906) (AB 3736)
- Shops with residences 256-266 First (1870s-1906) (AB 3736)
- Residence at 518 Folsom (1857-1906) (AB 3736)
- Outbuilding associated with carriage house at 34 Essex (1880s-1906) (AB 3749)
- Dwellings on Perry Street (1870s-1906) (AB 3763)
- Structure near Fifth Street (1850s) (AB 3761)
- Residences at 807-33, 834-857 Harrison Street (1870s?-1906) (AB 3761)
- Residences at 202-218, 228-244 1/2, 250-258 Perry Street (1870s-1906) (AB 3761)
- Residences at 207-217, 223-257 Perry Street (1870s-1906) (AB 3761)

- Residences at 404-409, 413-417, 441-447 Fifth Street (1870s?/80s-1906) (AB 3761)
- Residences at 570-586 Bryant Street (1870s?/1880s-1906) (AB 3761)
- Structure (early 1850s) (AB 3760)
- The Russ House(?) (1850s-1860s) (AB 3760)
- Building on Sixth Street near Harrison Street (late 1850s) (AB 3760)
- Two buildings on Bryant Street between Fifth Street and Oak Grove Avenue (1850s) (AB 3760) Building in mid-block (1850s) (AB 3760)
- Building on Harrison Street near Fifth Street (1850s) (AB 3760)
- Residence at 750 Bryant Street (late 1850s?-1906) (AB 3760)
- Residences and lodgings above stores at 400-418, 416-428, and 432-446 Fifth Street (1860s(?)1880s-1906) (AB 3760)
- Residences at 3-36 and 5-39 1/2 Madison Avenue (1870s?/1880s-1906) (AB 3760)
- Residences at 7-37 1/2 and 6-34 Oak Grove Avenue (1870s?/1880s-1906) (AB 3760)
- Residences at 3-57 Morris Avenue (1870s?/1880s-1906) (AB 3760)
- Residences at 6-60 Morris Avenue (1870s?/1880s-1906) (AB 3760)
- Residences at 905-915, 921-985 Harrison Street (1870s?/1880s-1906) (AB 3760)
- Residences at 702-716, 720-772 Bryant Street (1870s?/1880s-1906) (AB 3760)
- Residences at 401-405, 419-431, 437-445 Sixth Street (1870s?/80s-1906) (AB 3760)
- Undocumented residential areas on AB 202/203
- Undocumented residential areas in Mid-Embarcadero Area

As with commercial contexts, domestic sites are frequently mixed or next to commercial sites so that refuse, features and contents of burned structures may be mixed. Discrete, intact deposits such as refuse pits, privies, contents of buildings, etc. would best serve to address research questions. As most of the Project area burned in the 1906 fire, contents of residences may survive and yield sufficient, discrete data. Eligibility for nomination to the National Register of Historic Places would most likely qualify under Criterion D.

Institutions

- St. Mary's Hospital (1861-1906) (AB 3764)
- Silver Street Kindergarten (1878-1906) (AB 3763)
- Mizpah Presbyterian Church at 859 Harrison Street (1890s-1906) (AB 3761)

The hospital and school were significant to the history of San Francisco and refuse deposits and remains of structures would be amenable to archaeological study. For example, architectural remains, artifacts associated with specific individuals, and artifacts representative of occupants may survive at the site of St. Mary's Hospital. Such deposits might qualify under Criterion D for eligibility for nomination to the National Register of Historic Places.

Fill Artifacts

- Assessor's Blocks 202/203 (1880s-1890s)
- Washington Street at Front Street (1850s)
- North Side of Folsom Street between Main and Beale Streets (1850s)
- Mid-Embarcadero Area (1860s-1880s+)

Fill materials generally may be expected to be ineligible for the National Register. However, discrete deposits may be identifiable whose provenance, or at least social or ethnic origin is identifiable, increasing its potential significance. These would have to be determined on a case by case basis.

The cultural resources identified above are described in detail in the Archaeological Survey Report prepared for the Mid-Embarcadero Roadway Replacement Project. The eligibility of these resources for inclusion on the National Register has not been determined unless otherwise indicated.

4. ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

This section analyzes the potential environmental consequences of the project alternatives. Potential adverse and beneficial impacts of each alternative are analyzed in the future year of 2015, as compared to the existing and pre-earthquake conditions presented in the previous section. Where an impact would be more severe when compared with one baseline as opposed to another (i.e., if an impact would be worse when compared to pre-earthquake instead of existing conditions, or vice-versa), that comparison is emphasized.

Because Alternative One, the No Build Alternative, would include no project-related changes, it represents the 2015 "future context" and serves as a comparison for the build alternatives. In other words, by comparing the build and no build alternatives, it is possible to see what aspects of the projected future setting would be different because of the implementation of any build alternative. More details about the projected future setting or the 2015 " future context" are presented in the Land Use, Socio-economic, Transportation, and Growth Inducement sections below.

As a general rule, the City of San Francisco considers mitigation measures when necessary and feasible in order to reduce or eliminate potentially significant environmental effects. Consistent with FHWA and Caltrans procedures, the mitigations presented below address project-related impacts identified for each build alternative, even if those impacts would not necessarily constitute a significant impact.

4.1 LAND USE

The San Francisco Charter gives the City Planning Commission authority over the City's Master Plan, which contains policies and objectives related to land use throughout the City. Prior to approval of any alternative to replacement of the Embarcadero Freeway and the Terminal Separator Structure, the City Planning Commission must find that alternative consistent with the San Francisco Master Plan, and Master Plan policies such as those listed on pp. 99-103.

The San Francisco Bay Conservation and Development Commission (BCDC) has permit and review authority over portions of the project area, as described on page 96. The BCDC's San Francisco Waterfront Special Area Plan and San Francisco Waterfront Total Design Plan -- Piers

7 through 24, were adopted as amendments to the BCDC's San Francisco Bay Plan in 1975 and 1980 respectively, and both address land uses along San Francisco's northern waterfront. The 1980 Total Design Plan, as amended, is the more specific of the two plans, and contains site-specific design guidelines that would apply to portions of the Embarcadero roadway, including pedestrian facilities and landscaping, proposed in all build alternatives. When considering approval of any alternative to the Embarcadero Freeway, the BCDC would consider whether that alternative was consistent with the Total Design Plan per the coastal zone management program; if necessary, the BCDC could also amend the Plan.

All build alternatives appear generally consistent with policies and objectives of local and regional land use plans, although official determinations of consistency would be made by the San Francisco Planning Commission (in the case of San Francisco Master Plan) and the San Francisco Bay Conservation and Development Commission (in the case of the San Francisco Bay Plan, Special Area Plan, and Total Design Plan).

4.1.1 LAND USED

Alternative One, No Build, would perpetuate existing land use conditions in the Mid-Embarcadero area. The only change would occur between Folsom and Howard Streets, where the southbound lanes of The Embarcadero will be realigned as part of the MUNI Metro Turnback project and the northbound lanes would be realigned as a separate City project to allow creation of the planned Rincon Point Park. The potential impacts of these realignments were discussed in the Environmental Assessment for the Embarcadero Surface Roadway.

With one exception, all roadway and ramp features of the build alternatives would be located within existing transportation facility right-of-way. The one exception would occur under Alternative Five, which would use approximately 0.15 hectares (0.37 acres) of the eastern edge of Justin Herman Plaza, a Section 4(f) resource located opposite the Ferry Building.[1] (See Figure 4.1-1.) Mitigation of this impact would require compressing the roadway median proposed in Alternative Five. (See p. 228 for an explanation and illustration of the "Mitigated Alternative

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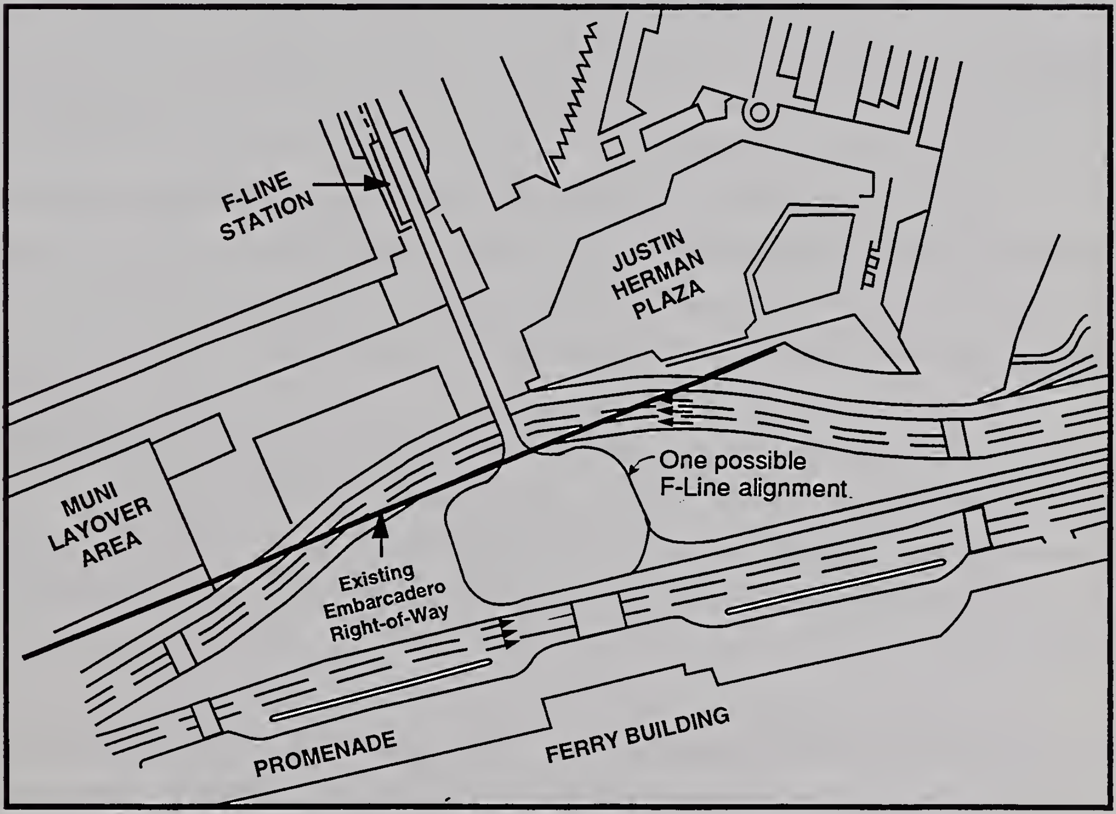
[1] Section 4(f) of the Transportation Act of 1966 requires federal transportation agencies to make a special effort to preserve parkland and historic resources. The first step in an evaluation of 4(f) issues is to identify publicly-owned parks and historic resources that meet the definition of 4(f) resources. Justin Herman Plaza meets the definition and could be "used" for transportation purposes only if there were no feasible and prudent alternative, and if there has been all possible planning to minimize harm. (See the Draft Section 4(f) Evaluation attached at the end of this document for more information.)

View looking southeast at the lawn area of Justin Herman Plaza



Schematic - No Scale

Source: E.M. Rose and Associates
Public Affairs Management

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Land Required From Justin Herman Plaza Under Alternative 5	Figure 4.1-1

Five.") This potential impact and mitigation are discussed further in the attached Draft Section 4(f) Evaluation.

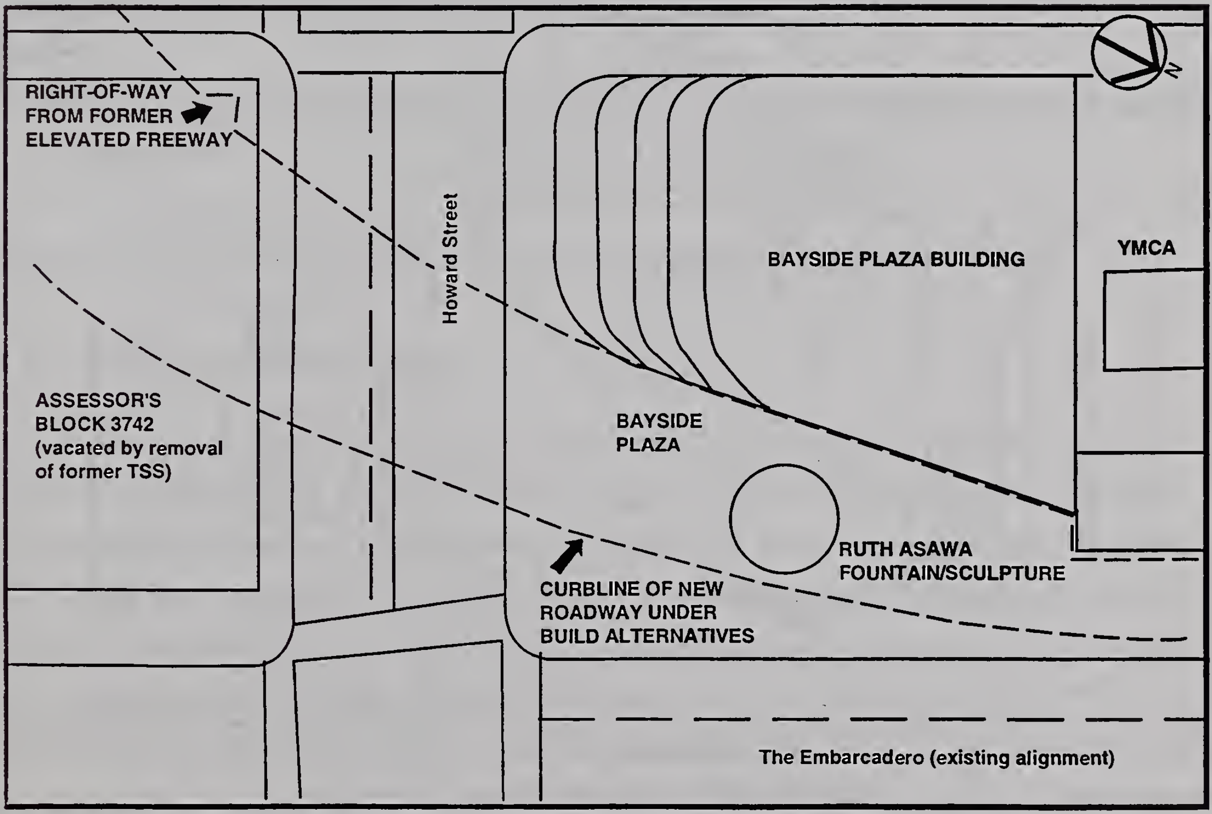
With existing right-of-way, all build alternatives would realign the roadway, expand pedestrian facilities, and accommodate the planned MUNI F-Line (light rail). These actions would require use of portions of the existing Embarcadero roadway median currently used for off-street parking. All build alternatives would also use approximately 34 square meters (375 square feet) of land from the 557 square meter (6,000 square foot) office plaza in front of the Bayside Plaza office building on The Embarcadero at Howard Street. This office plaza is within the right-of-way of the former Embarcadero Freeway and currently includes a circular bench and fountain sculpture designed by Ruth Asawa. The proposed encroachment into this plaza, which would accommodate a 4.5 meter (15 foot) -wide sidewalk and a .6 meter (two foot) -wide section of roadway, would not necessitate respositioning of the bench and fountain sculpture (see Figure 4.1-2).

Alternatives Three and Five would reopen Davis Street between Clay and Washington Streets to vehicular traffic. This section of Davis Street was closed for the construction of the Clay and Washington ramps of the Embarcadero Freeway and is a mapped but unimproved street, currently used as a landscaped pedestrian walkway. Reopening Davis Street would result in removal of approximately 0.09 hectare (0.23 acre) of open space. This open space is currently used primarily by office workers in the area, residents of the Golden Gateway development, and the general public for pedestrian access between Washington and Clay Streets (see Figure 4.1-3). Under all build alternatives, an equivalent amount of open area would be added along the margin of the Embarcadero roadway and Assessor's Block 202.

Under the Second Street Option of Alternatives Three and Five, the existing sidewalk and curb parking along the north side of Stillman Street, between Second and Third Streets, would be removed to accommodate the proposed I-80 eastbound off-ramp. The impacts of this change on parking and pedestrian circulation are discussed respectively in Section 4.5.3 and Section 4.5.5.

All build alternatives would change the use of areas currently used for Port parking. Under the pre-earthquake and existing conditions, parking was and is located in front of the Ferry Building, along The Embarcadero, and in the Embarcadero median (under the freeway in pre-earthquake conditions). The area in front of the Ferry Building and the roadway median would

View of Bayside Plaza from The Embarcadero looking west

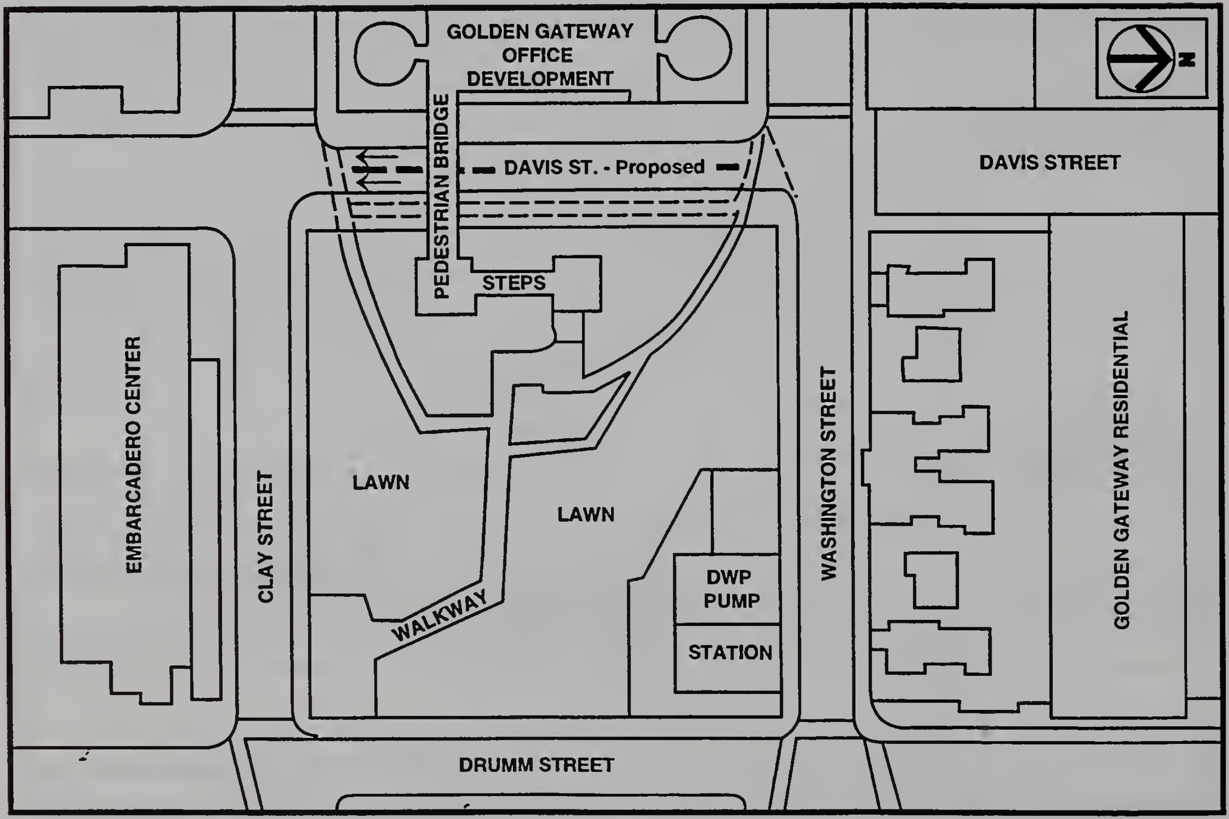


Schematic - No Scale

Source: E.M. Rose and Associates

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Land Required From Bayside Plaza Under All Build Alternatives	Figure 4.1-2

View of the Davis Street Right-of-Way looking from Clay Street



Schematic - No Scale

Source: E.M. Rose and Associates

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Land Required to Re-Open Davis Street Right-of-Way Under Alternatives 3 and 5	Figure 4.1-3

be used for transit, roadway, and pedestrian features in all build alternatives. The amount of pre-earthquake and existing Port parking displaced in each alternative is discussed in Section 4.5.3.

Sidewalks at the following locations would be narrowed from their pre-earthquake and existing widths under all build alternatives:

1. West Embarcadero south of Broadway, from 2.4 meters (eight feet) to 1.8 meters (six feet).
2. West Embarcadero between Pier 3 and Pier 5, from 6.7 meters (22 feet) to 4.5 meters (15 feet).
3. West Embarcadero in front of the MUNI bus layover area, from 6.1 meters (20 feet) to 4.5 meters (15 feet).
4. East Third Street south of Market Street, from 4.9 meters (16 feet) to approximately three meters (10 feet).
5. West side of the pedestrian island at Market, Kearney and Geary Streets; from 55 square meters (600 square feet) to 39 square meters (420 square feet).

6. South (or North) Bryant Street east of Main Street, from 6.1 meters (20 feet) to 3.7 meters (12 feet).

The effects of these changes on pedestrian circulation is discussed in Section 4.5.5, p. 351.

4.1.2 LAND MADE AVAILABLE

The removal of the elevated Embarcadero Freeway, the Terminal Separator Structure, and associated ramps has freed up approximately 8.5 hectares (21 acres) of land formerly occupied by these transportation facilities. Table 4.1-1 and Figure 4.1-4 show the site area and location of the vacated public parcels on six blocks to the north of Market Street (Assessor's Blocks 139, 140, 141, 165, 202 and 203), and the nine blocks with the largest vacated public parcels to the south of Market Street (Assessor Blocks 3718, 3736, 3737, 3738, 3739, 3740, 3741, 3742, 3749, 3763, and 3764). With the exception of parcels on Assessor Blocks 3737, 3763, and 3764, all vacated public parcels would be available under all build alternatives for uses other than

TABLE 4.1-1

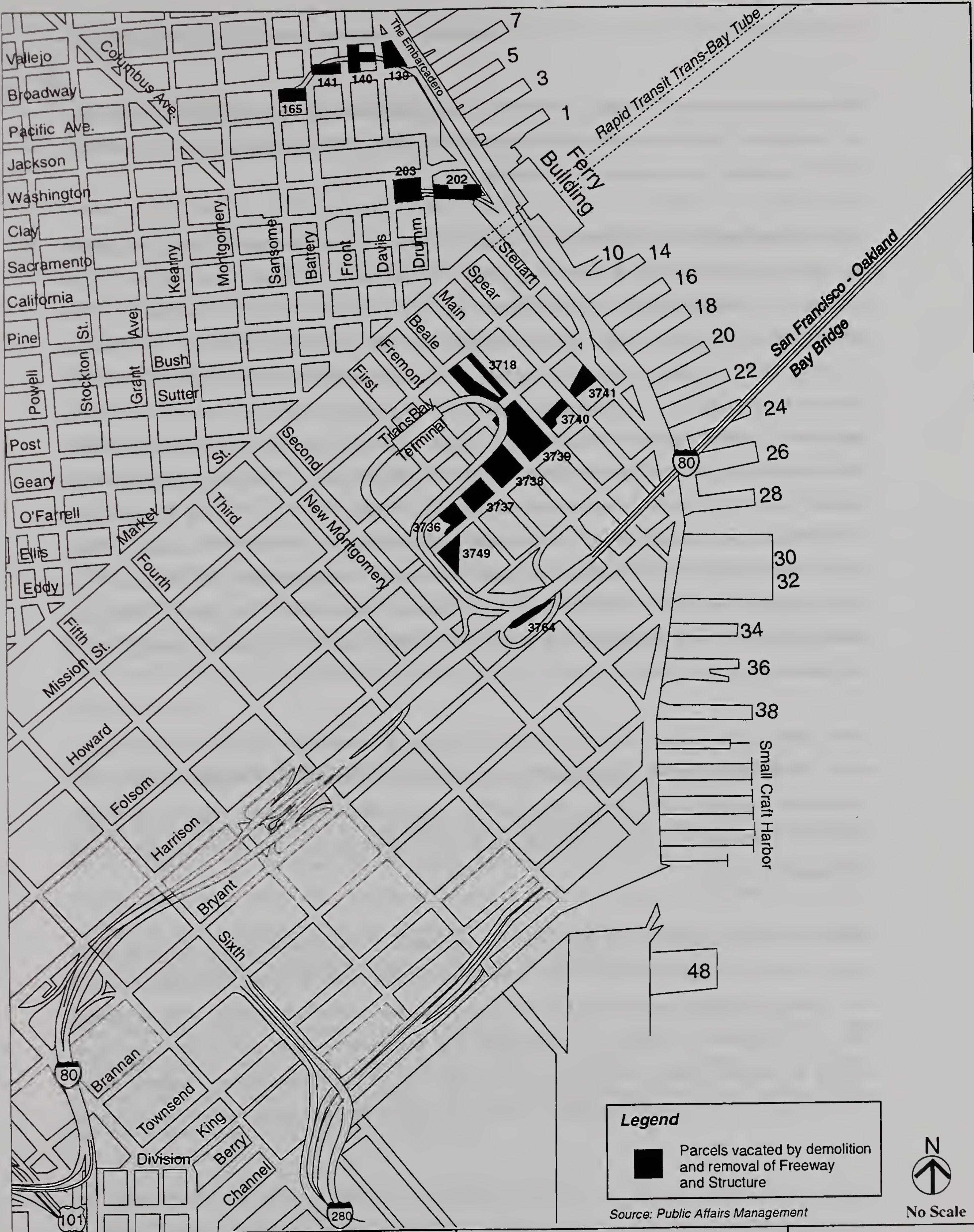
VACATED BLOCKS WITH ALL ALTERNATIVES (exceptions noted)

Assessor Block	Site Size Sq. Ft.	Sq. Meters
North of Market Street		
139	3,049	283
140	47,978	4 457
141	30,936	2 874
165	17,846	1 658
202	57,616	5 353
203	64,629	6 004
Subtotal	222,054	20 629
South of Market Street[1]		
3718	80,313	7 461
3736	41,000	3 809
3737[2]	56,000	5 202
3738	66,000	6 132
3739	90,000	8 361
3740	34,133	3 171
3741	37,897	3 521
3742	10,576	983
3749	35,163	3 2667
Subtotal	451,082	41 907
TOTAL	673,136	65 536

Source: Planning Department, City and County of San Francisco, 1993.

[1] In addition to the Blocks listed below, small areas of land would be vacated under all project alternatives on Block 3764, and under Alternatives 2 and 4 on Block 3763. Small state-owned parcels on Blocks 3742 and 3715 would be transferred to City ownership and would remain as right-of-way.

[2] Under Alternatives 3, 4 and 5 approximately 0.3 hectares (0.7 acres) of the vacated land on this Block would be used for the realignment of the I-80 westbound Fremont Street off-ramp.



Source: Public Affairs Management

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Parcels Vacated by Removal of the Embarcadero Freeway and Terminal Separator Structure	Figure 4.1-4

transportation facilities[2]. Section 4.16 of this report analyzes likely development on these sites as it relates to the overall development projected to occur in San Francisco by future year 2015, and to the project's potential to induce growth.

California Senate Bill 181, adopted on October 5, 1991, established conditions and procedures for the transfer of excess State-owned public right-of-way to the City and County of San Francisco. These conditions and procedures apply to land formerly occupied by the Embarcadero Freeway, but have not been established for the transfer of excess land formerly occupied by the Terminal Separator Structure. The conditions require that excess parcels either be used for a replacement transportation facility, or that proceeds from their sale be used for the replacement project. As of February 9, 1995, parcels on Blocks 139, 140, 141, 165, 202, and 203 have been transferred to City ownership. While the ultimate use of these former Embarcadero Freeway parcels has not been determined, the parcels on Blocks 139, 140, 141 and 165 are zoned C-2 (Community Business), which would permit commercial or residential development. These parcels, which would not be required for construction of any of the alternatives, are intended to be sold to private individuals, with the proceeds going towards construction of the project. Parcels on Blocks 202 and 203 are expected to be the subject of further study and possible rezoning prior to their sale or reuse.

Under Alternatives Three, Four, and Five, the existing I-80 westbound Fremont Street off-ramp would be realigned to the intersection of Fremont and Folsom Streets, thereby reducing the development potential of Assessor Block 3737. Public right-of-way land vacated on Blocks 3763 and 3764 would be used by Alternatives Three and Five for a portion of the Harrison Street westbound on-ramp.

Under Alternatives Two, Three and Four, the curvature of the Embarcadero roadway lanes would provide approximately one-tenth hectare (one-quarter acre) of space immediately in front of the Ferry Building (between the Ferry Building and the northbound lanes). This additional area would represent a change in pre-earthquake and existing land use in this area, from parking to sidewalk/plaza open space. The curvature of the Embarcadero roadway under Alternatives Two, Three and Four would also add approximately one-tenth hectare (one-quarter acre) of area adjacent to Justin Herman Plaza at its eastern edge. This additional area would represent a change from roadway/sidewalk to landscaped plaza.

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[2] For more details on land made available under the project alternatives, please see the Land Use section of the Land Use/Socio-economic/Growth Inducement Background Report. A copy of this report is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

Under Alternative Five, an open space area of approximately 0.4 hectare (one acre) in size would be created between the northbound and southbound lanes of the Embarcadero roadway in front of the Ferry Building. This would represent a change in land use from parking and median walkway to improved open space which would be under Port jurisdiction. The specific design of a widened promenade or plaza area would be developed as part of the separate Mid-Embarcadero Open Space project.

Under all build alternatives, the west sidewalk and bayside promenade between Folsom and Howard Streets would be relocated from their pre-earthquake locations to be along the new Embarcadero alignment. In most locations (except those listed on p. .217), all build alternatives would widen or preserve existing pedestrian facilities and accommodate a landside sidewalk of at least 4.5 meters (15 feet) and a bayside promenade of at least 7.6 meters (25 feet) along The Embarcadero. All build alternatives would also make available approximately 0.15 hectare (0.37 acre) of land in front of the E-Street (Steuart) Row between Howard and Mission Streets, which would be used for additional short-term parking where feasible given the shape and width of the area.

4.1.3 2015 EMPLOYMENT FORECAST AND PROJECTED DEVELOPMENT

The Downtown Plan, published in 1984, anticipated that 90,000 new jobs would be located in the C-3 Districts of downtown San Francisco between 1981 and 2000, resulting in a total employment base of about 370,000 jobs at the end of the forecast period. The Mission Bay EIR, certified in 1990, projected that the downtown C-3 District's employment would total about 331,000 jobs in 2000, increasing to between 360,000 and 362,000 jobs in 2020.

The Downtown Plan Monitoring Report, published in 1994, indicates that downtown San Francisco added nearly 20,000 jobs between 1980 and 1995, but lost almost 27,000 jobs between 1985 and 1993. In light of these trends, the projections of both the Downtown Plan and the Mission Bay EIR appear to be aggressive.

The employment projections used in this analysis adopt as a starting point the forecasts published by the Association of Bay Area Governments (ABAG). Projections 92 Revised, which is the basis of the MTC travel model forecast used in the transportation analysis presented in Section 4.5 of this report, anticipates that total employment in San Francisco would reach 683,150 by 2010.[3] Projections 94, the most recent forecast, anticipates that total Bay Area employment would increase from 2,537,776 jobs in 1990 to 3,996,320 jobs in 2010 and that San Francisco employment would increase from 556,030 jobs in 1993 to 667,570 in 2010.

The horizon year for the current analysis is 2015, five years beyond the horizon year for ABAG's Projections 92 and Projections 94. Therefore, it is necessary to extend the ABAG projections further into the future. For the transportation analysis, this extension was based on an estimate of reasonable development at or near vacated freeway parcels. To complete the socio-economic and growth inducement analysis, a more detailed forecast was developed based on an analysis of regional influences on employment growth, in conjunction with an analysis of the trend in the ABAG projections for the Bay Area and San Francisco.[4] It is ABAG's expectation that San Francisco's share of regional employment and its average annual employment growth rate would both decline over time, consistent with the historical trend. Based on these analyses, San Francisco employment is projected to grow to a total of 686,100 jobs in the year 2015. Compared to the recession-reduced employment level of 556,090 jobs in 1993, this total represents a gain of 130,010 jobs during the 22 years of the forecast period. There are presently a number of development projects that are planned but unbuilt, such as the Gap office building and the Ferry Building rehabilitation projects. These "reasonably foreseeable" future projects contribute to the forecast presented here.

Employment growth in San Francisco is expected to continue to occur opportunistically in reasonably-priced space (depending on vacancy rates in San Francisco compared to those in the rest of the region). It is expected that some core group of firms and functions -- e.g., those with international operations and/or identities -- would continue to require San Francisco locations. At the same time, the increase in the number of San Francisco-based workers would be moderated by factors such as (1) desires to reduce vulnerability to transportation problems that could occur if transbay transportation connections were damaged and (2) technological changes that will make working from home a real possibility for a substantial number of workers.

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[3] ABAG's Projections 92 Revised anticipate an increase of 47,360 jobs in the downtown area, to a total of 271,100, and an increase of 89,200 jobs in the greater downtown, to a total of 458,000, between 1990 and 2010. In this case, the downtown area is the area bordered generally by Chestnut Street on the north; Mason, Powell, Fourth and Third Streets on the west; and Townsend Street on the south. The greater downtown area is the area generally east of Van Ness Avenue, Eleventh Street and the transition ramp from U.S. 101 to Interstate 80, and north of Sixteenth Street (east of Interstate 280) and Seventh Streets (between Interstate 280 and the U.S. 101/Interstate 80 transition ramp). Neither of these two areas (downtown or greater downtown) corresponds to the C-3 Districts or to the "Downtown & Vicinity" defined in the Mission Bay EIR.

[4] To 'Close the Loop", the results of the more detailed forecast were compared to employment projections used in the transportation analysis. Overall, volumes were found to be within 1 to 2%. (Korve Engineering, April 21, 1994 Memo: *"Updated Future Land Use Data Sensitivity Analysis".*)

The geographic distribution of jobs in San Francisco between the greater downtown area and the rest of the City results largely from the orientation of the economic activities that create employment. Activities that are oriented toward local population and businesses are more likely to be located near their consumers, in the residential neighborhoods outside of the downtown and vicinity.[5] Activities that are oriented toward regional, national and international markets are more likely to be located in the greater downtown area since by clustering, office-based activities gain advantages of easy access to each other and to relevant services as well as to business visitors from out of town, while retail-based uses gain advantages of proximity to each other that facilitate comparison shopping by both residents and out-of-town customers. Jobs in the various economic sectors[6] exhibit different geographic distributions in San Francisco, based in large part on their orientation toward local versus regional, national and international markets. Based on these considerations and on the existing and projected jobs by economic sector, it is anticipated that about two-thirds of all San Francisco employment -- a total of 459,900 jobs -- would be located in the greater downtown area in the year 2015. This number represents an increase of about 64,650 jobs over existing employment levels.

Employment growth in San Francisco during the next two decades is expected to require some new building space. The amount of new building space required will depend on a variety of factors including the types of economic activities that create the added employment, the ways in which those activities use space, and the amount of existing building space that is or will be vacant and available to accommodate new employment.

Based on the projected sectoral distribution of employment in the year 2015 and the types of building space occupied in each sector[7], total employment in downtown and vicinity in that year is expected to occupy 7.7 million square meters (83.1 million square feet) of office space, 1.6 million square meters (17.8 million square feet) of retail space, 1.9 million square meters (20.9 million square feet) of hotel space and 0.5 million square meters (5.5 million square feet) of industrial/warehouse/automotive space. These figures include a vacancy allowance equal to five percent of the total space. The translation of jobs to building space, with intermediate steps for building space per worker and the calculated vacancy allowance, is shown in Table 4.l -2.

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[5] There are some residential neighborhoods within the greater downtown area, and local-serving businesses oriented to those neighborhoods would naturally be located within the downtown and vicinity as well.

[6] The Standard Industrial Classification (SIC) Code includes the following major sectors: agriculture, mining, construction, manufacturing, retail trade, wholesale trade, transportation-communications-utilities, finance-insurance-real estate (FIRE), services and government.

[7] San Francisco Department of City Planning, *Downtown Plan EIR*, Volume 2, Appendix H, pp. H.23-H.24, Table H4.

The inventory of building space available to accommodate the demand estimated in Table 4.1-2 will consist of both existing space and additions to the existing building stock. Table 4.1-3 describes the total future inventory, detailed by existing buildings and known projects. The table identifies 7.1 million square meters (76.8 million square feet) office space, 1.6 million square meters (17.4 million square feet) of retail space, 2 million square meters (21.6 million square feet) of hotels and 0.8 million square meters (9.1 million square feet) of industrial/warehouse/automotive space in the entire study area.

Combining the information about the expected demand for building space (including an allowance for vacant space) in the greater downtown area with the expected supply of space yields an estimate of the additional space that would be needed to accommodate employment activity in the downtown and vicinity in the year 2015. That estimate is presented in Table 4.1-4, which indicates that additional office and retail space would be needed, but that the anticipated supplies of hotel and industrial space in the downtown area are expected to accommodate future demand.[8] In all, 0.6 million square meters (6.7 million square feet) of new building space — an amount equal to about 5.4 percent of the anticipated inventory — would be needed to house the new jobs expected. The figures shown in Table 4.1-4 implicitly assume that some or all of the existing vacant office space will be occupied by the end of the forecast period.[9]

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[8] The demand for new office, retail and industrial/warehouse/automotive space is estimated based on the expected employment growth in sectors that occupy those types of space. The demand for hotel space is estimated based on other factors, but the amount of space actually required to accommodate the expected demand is reflected in the number of jobs that would be required to operate that space. Therefore, employment forecasts are useful in assessing the amount of new space of all types that would be needed in the future.

[9] Some of the existing vacant space could remain vacant, comprising all or a portion of the five percent vacancy assumed to exist at the end of the period. It is most likely, however, that much of the existing vacant space will be occupied before any new construction occurs. New construction will be stimulated only when demand is sufficient to force obtainable rents higher than they are now, to a level at which they support new construction.

TABLE 4.1-2

TOTAL BUILDING SPACE REQUIRED TO ACCOMMODATE PROJECTED DOWNTOWN & VICINITY EMPLOYMENT IN 2015

Type of Space	Number of Workers	Building Space/Worker[1]		Building Space Required		Vacancy Allowance		Total Space Required	
		Square Feet	Sq.are Meters	Square Feet	Sq.are Meters	Square Feet	Sq.are Meters	Square Feet	Sqare Meters
Office	336,951	235	22	79,184,000	7 356 000	3,959,000	368 000	83,143,000	7 724 000
Retail Trade	48,323	350	33	16,913,000	1 571 000	846,000	79 000	17,759,000	1 650 000
Hotel	21,961	908	84	19,940,000	1 852 000	997,000	93 000	20,937,000	1 945 000
Industrial/Warehouse/Automotive	12,882	410	38	5,282,000	491 000	264,000	25 000	5,546,000	515 000
Total[2]	420,117			121,319,000	11 270 000	6,066,000	564 000	127,384,000	11 834 000

1. The employment densities (*i.e.*, building space per worker) used in this analysis are drawn from the Mission Bay EIR, with one exception: the density for office jobs is assumed to be 235 square feet per employee, compared to 275 square feet used in that study. The *Economic and Growth Inducement* technical background report explains the reasons for this change, which reflects current and anticipated trends toward a reduction in space per worker and the more flexible work arrangements that are expected in the future. A copy of this background report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

2. Excludes employment in cultural, educational and institutional space, estimated to total 39,830 jobs in 2015.

Source: San Francisco Department of City Planning, *Downtown Plan EIR*, Volume 2, Appendix H, pp. H-21,-H-22, Table H.3; San Francisco Department of City Planning, *Mission Bay Final EIR*, Section XIV, Appendices, pp. XIV.A.10-XIV.A.11, Table XIV.A.2; ABAG, *Projections* 94; Mundie & Associates.

TABLE 4.1-3

TOTAL FUTURE BUILDING SPACE INVENTORY BASED ON EXISTING PLUS KNOWN PROJECTS[1]

Type of Space	Existing Building Space		Likely Development[2]		Anticipated Future Inventory	
	Square Feet	Square Meters	Square Feet	Square Meters	Square Feet	Square Meters
Office	72,189,000	6 706 000	4,588,000	426 000	76 777 000	7 133 000
Retail	16,833,000	1 564 000	593,000	55 000	17 426 000	1 619 000
Hotel	21,640,000	2 010 000	0	0	21 640 000	2 010 000
Industrial/Warehouse/Automotive	9,097,000	845 000	0	0	9 097 000	845 000
Total	119,759,000	11 126 000	5,181,000	481 000	124 940 000	11 607 000

1. Total future building space inventory once known projects and potential projects ("Likely Development/Redevelopment") are completed; date is uncertain but is assumed to be before 2015.

2. "Likely development" consists of approved but unbuilt projects, and planned "reasonably foreseeable" future projects.

Source: *Economic and Growth Inducement Analysis, San Francisco Terminal Separator Structure/Mid-Embarcadero Roadway Alternatives*, Mundie & Associate, January 1994. A copy of this background report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

TABLE 4.1-4

NEW BUILDING SPACE REQUIRED TO ACCOMMODATE PROJECTED DOWNTOWN & VICINITY EMPLOYMENT IN 2015

Type of Space	Space Requirement		Anticipated Inventory[1]		Additional Space Needed	
	Square Feet	Square Meters	Square Feet	Square Meters	Square Feet	Square Meters
Office	83,143,000	7 724 000	76,777,000	7 133 000	6,365,000	591 000
Retail	17,759,000	1 650 000	17,426,000	1 619 000	332,000	31 000
Hotel	20,937,000	1 945 000	21,640,000	2 010 000	0	0
Industrial/Warehouse/Automotive	5,546,000	515 000	9,097,000	845 000	0	0
Total	127,384,000	11 834 000	124,940,000	11 607 000	6,698,000	622 000

1. Includes existing building space and "likely development" which consists of approved but unbuilt projects and planned "reasonably foreseeable" projects.

Source: Mundie & Associates

Land Use Mitigation Measures

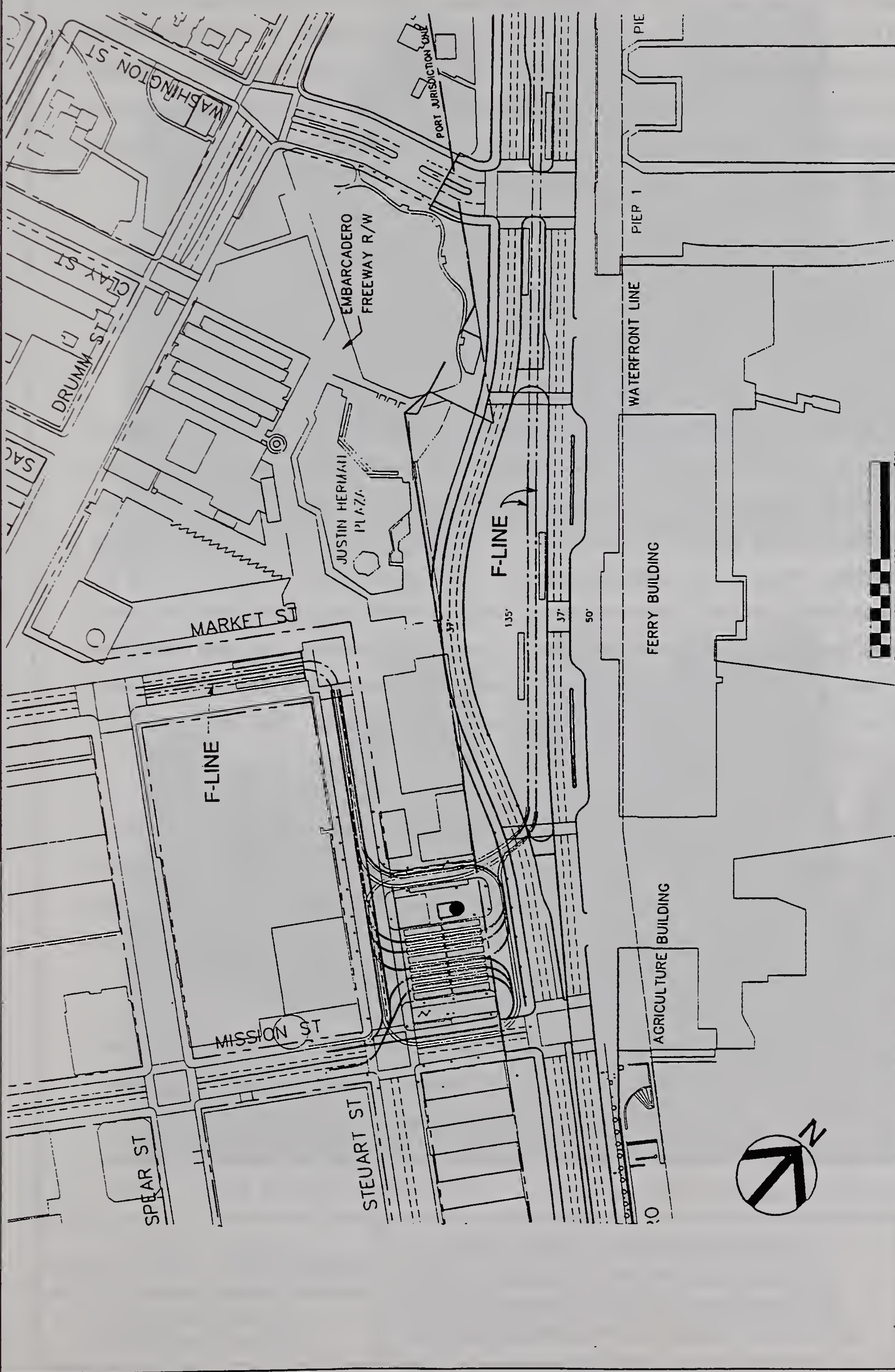
- To avoid the intrusion into Justin Herman Plaza that would occur under Alternative Five, the City would realign the roadway under this alternative so that the western curb of the Embarcadero roadway would abut but not encroach on the Plaza. (See Figure 4.1-5.) This realignment would eliminate the potential land use impact and would reduce the potential size of the plaza area proposed between the northbound and southbound lanes, effectively eliminating the possibility of an F-Line turn-around loop within the plaza. Other characteristics and potential impacts of the resulting roadway would be similar to Alternative Five as originally proposed.

- To assure a finished edge where the Embarcadero roadway would adjoin Justin Herman Plaza and parkland on Assessor's Block 202, the Department of Public Works (DPW) and the office of the Chief Administrative Officer (CAO) would coordinate design and construction of the roadway and sidewalk with the staff of the City's Recreation and Park Department.

4.2 VISUAL QUALITY

The effects of the project alternatives upon the visual quality and urban design of the study area would be observed by two primary groups: (1) pedestrian and vehicular users of the Embarcadero/TSS corridors, and (2) pedestrian and vehicular users of adjacent streets and occupants of adjacent buildings. To a lesser extent, the effects of the project would be observed by those with long views of the project (from the Bay, from the Bay Bridge, from I -80/U.S. 101, etc.).

Under the No Build and all build alternatives, views experienced by pedestrian and at-grade vehicular users of the Mid-Embarcadero corridor towards the San Francisco Bay, the Bay Bridge, the Ferry Building, Justin Herman Plaza, the Embarcadero Center, the Financial District and Telegraph Hill would be less limited and obstructed than prior to the demolition of the freeway, and would resemble those views now available under the existing conditions. Views within the corridor would also be less restricted, again resembling those views now available under the existing conditions. The views experienced by vehicular users of the elevated portions of the pre-earthquake Embarcadero Freeway would not be available under any of the five proposed alternatives.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

Figure 4.1-5

Mitigated Alternative Five

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

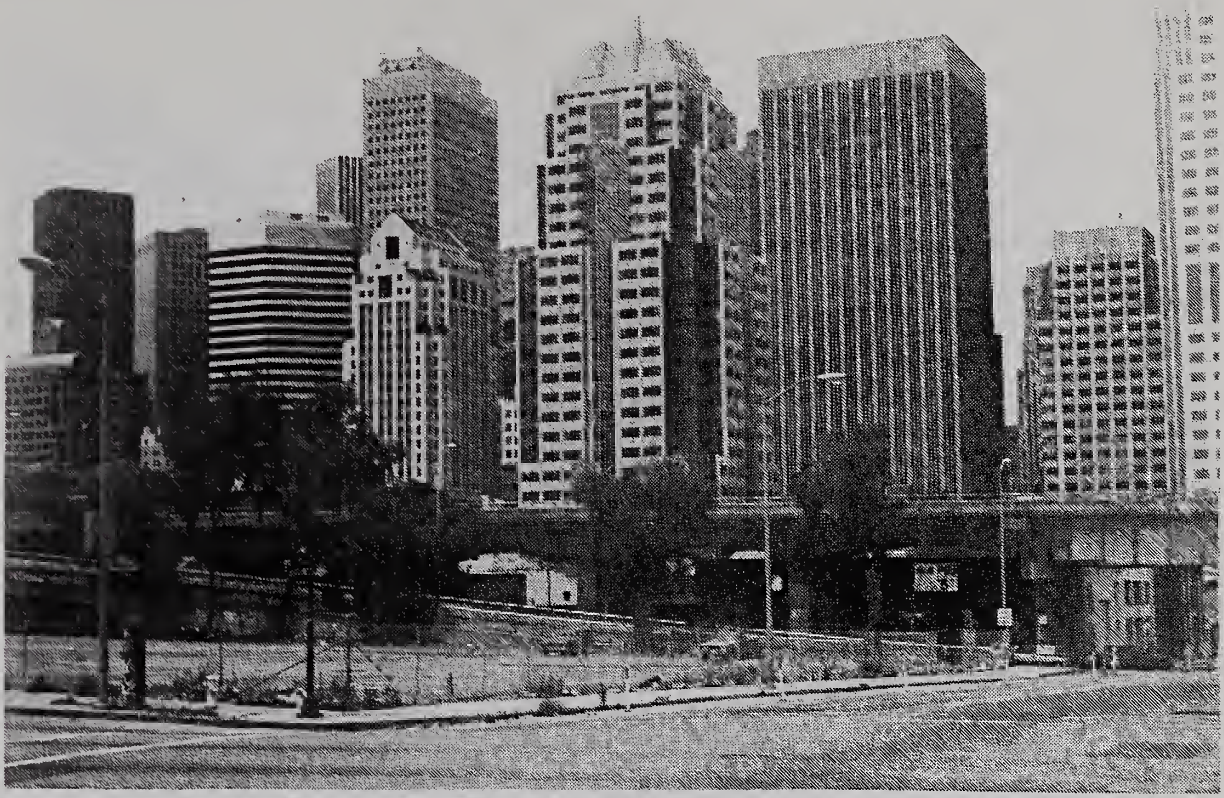
For users of buildings surrounding the Mid-Embarcadero corridor, views of the waterfront, the Bay and beyond would no longer be dominated by an elevated structure, and would resemble those now available under existing conditions. For pedestrian and vehicular users of adjacent streets, views of the waterfront would be less obscured, similar to those now available under existing conditions. Views of the City from the waterfront buildings, piers and open spaces would also be less obstructed, as with existing conditions.

In contrast to pre-earthquake conditions, the removal of the elevated freeway structure has opened vistas up and down The Embarcadero, thereby improving overall visual continuity along The Embarcadero under all alternatives. The different alternatives for treatment of the space directly in front of the Ferry Building are discussed in Section 4.3.

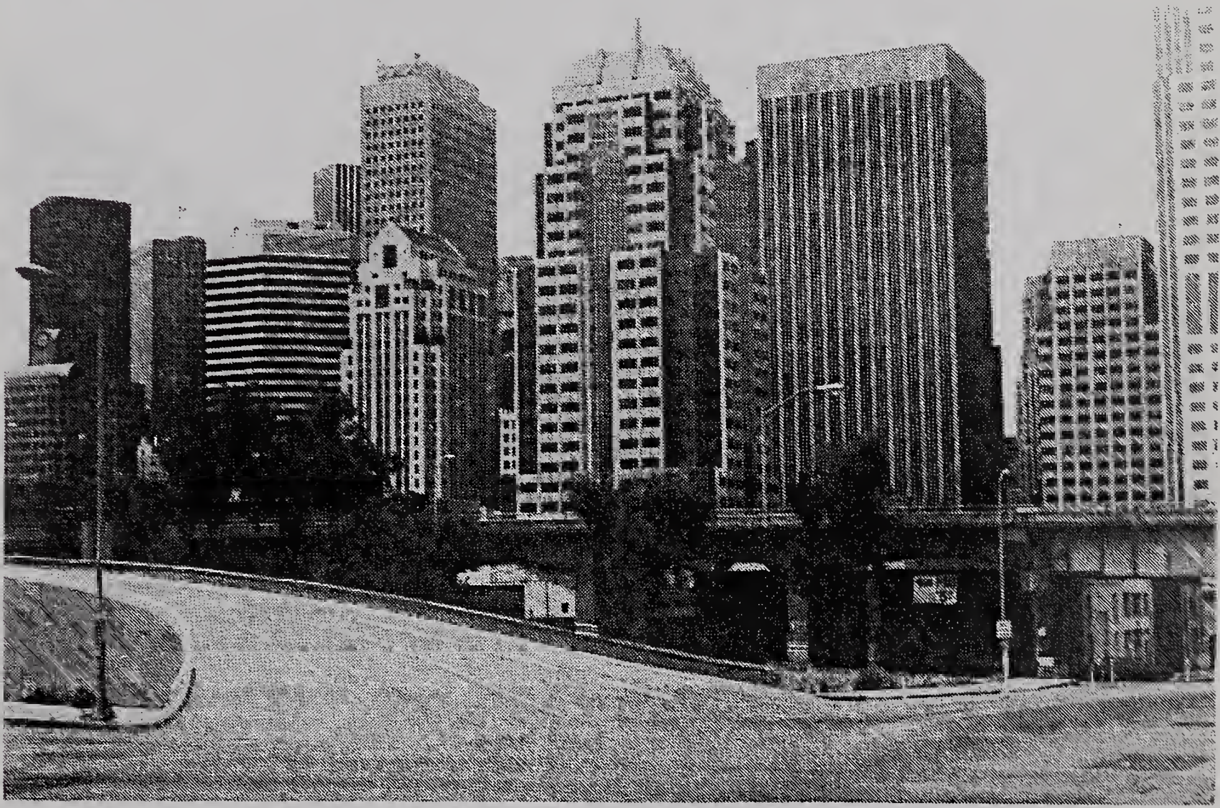
Under Alternatives Three, Four, and Five, which propose the reconstruction of the Fremont Street off-ramp to diagonally bisect the block and touch down at the intersection of Fremont and Folsom Streets, project users and project neighbors would experience views of a larger structure than presently exists. (See Figure 4.2-1 for an existing photo and a montage showing an approximate image of the proposed ramp.) The realigned ramp structure would be substantially smaller than the Terminal Separator Structure which occupied the site prior to the earthquake, and could be an entirely new ramp, as shown in Figure 4.2-1, or could modify the existing ramp to create a “Y” configuration, with two lanes terminating at the ramp's existing location, and two at the intersection of Folsom and Fremont Streets. (See Figure 4.2-2 for diagrams of both options.)

Under Alternatives Three and Five, which propose a new on-ramp connecting Harrison Street to I-80 westbound/U.S. 101 southbound near Essex Street, project users and project neighbors would experience views of a new structure. The new ramp would be much less visually obtrusive than the pre-earthquake structures in this area, and would immediately abut the existing elevated freeway which dominates vistas from Harrison Street to the south.

Under the Second Street Option of Alternatives Three and Five, which proposes a new I-80 eastbound off-ramp to touch down at Second Street between Harrison Street and Bryant Street, project users and project neighbors would experience views of a new structure immediately alongside the existing freeway. (See Figure 4.2-3. for an existing photo and a montage showing an approximate image of the proposed ramp.)



Source: Finger & Moy Architects, 1994

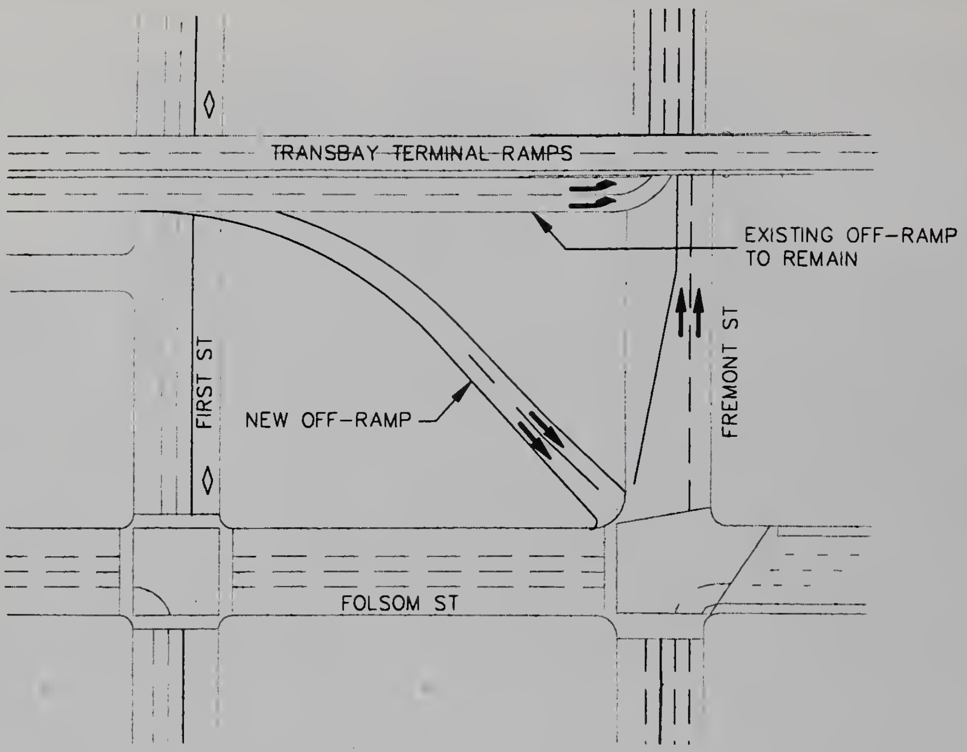


Source: Finger & Moy Architects, 1994

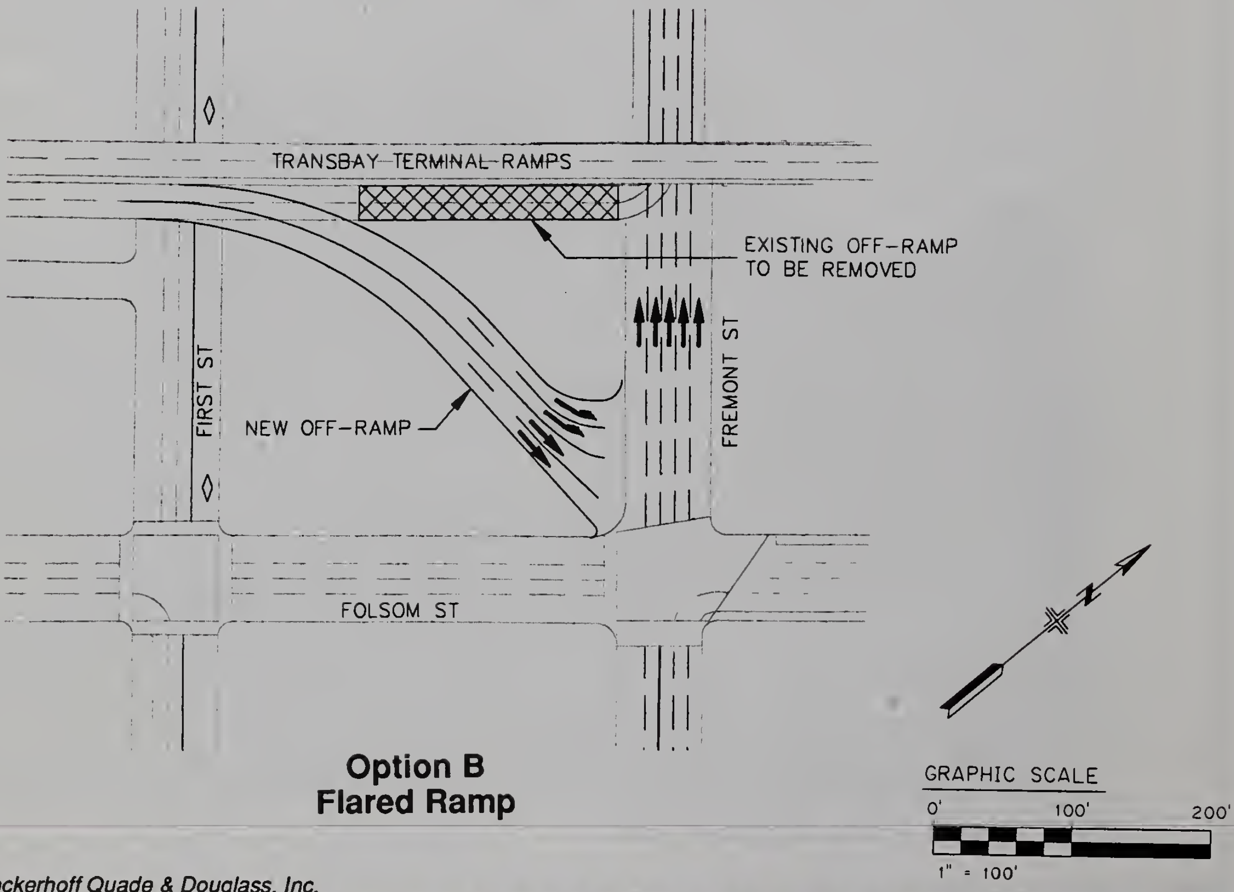
92.202E & 94.060E
ALTERNATIVES TO REPLACEMENT
OF THE EMBARCADERO FREEWAY
AND THE TERMINAL
SEPARATOR STRUCTURE

LOOKING WEST TOWARDS FREMONT ST. FROM FREMONT AND FOLSOM STREETS EXISTING (TOP); GENERAL APPEARANCE WITH ALTERNATIVES 3, 4, AND 5 (BOTTOM)

Figure 4.2-1



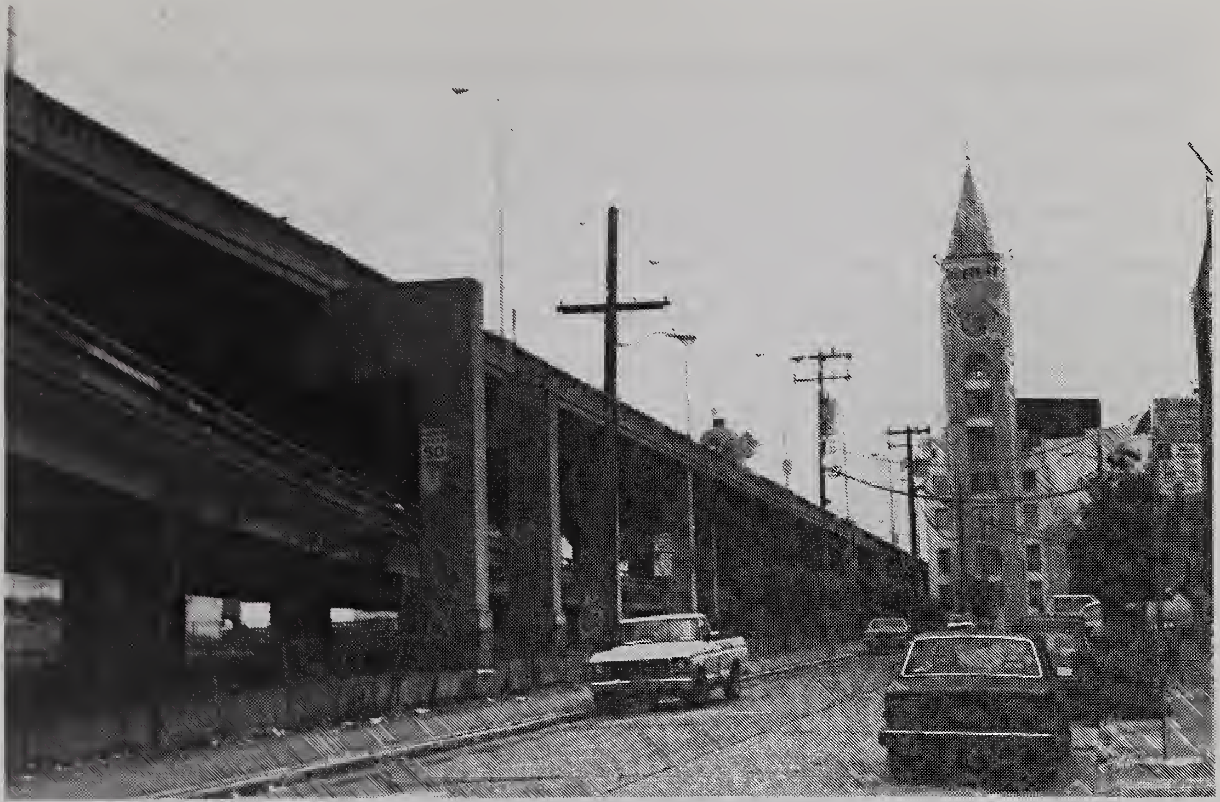
Option A
"Y" Configuration



Option B
Flared Ramp

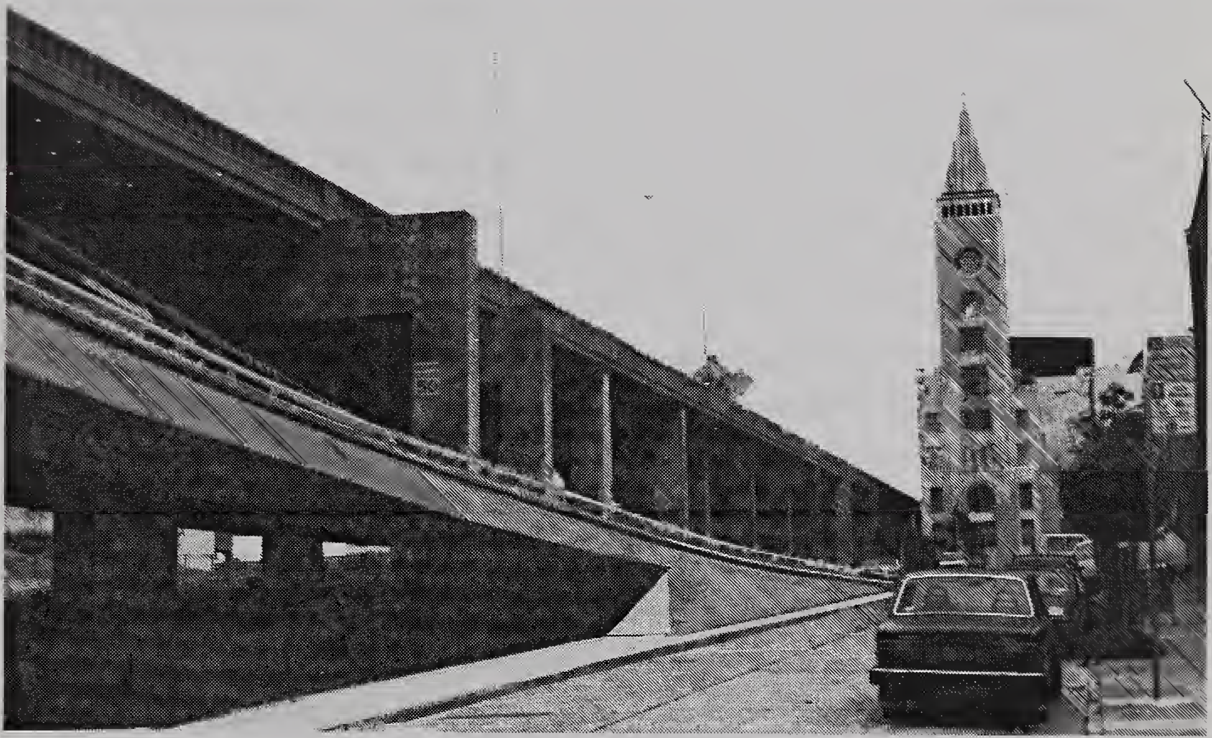
Source: Parsons Brinckerhoff Quade & Douglass, Inc.

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Possible Configuration of Modified Fremont Street Off-Ramp in Alternatives 3, 4 and 5	Figure 4.2-2



Source: Finger & Moy Architects, 1994

Note: Pre-earthquake and existing conditions are the same.



Source: Finger & Moy Architects, 1994

92.202E & 94.060E ALTERNATIVES TO REPLACEMENT OF THE EMBARCADERO FREEWAY AND THE TERMINAL SEPARATOR STRUCTURE	LOOKING EAST FROM THIRD STREET TOWARD SECOND & STILLMAN STREETS EXISTING (TOP); GENERAL APPEARANCE WITH ALTERNATIVES 3A, 5A (BOTTOM)	Figure 4.2-3

Under the Fourth Street Option of Alternatives Three and Five, which proposes a modified Fourth Street I-80 eastbound off-ramp, project users and project neighbors would experience views of a widened freeway and ramp. The eastbound mainline freeway, which is approximately 17 meters (56 feet) wide at Fifth Street, would be widened by 3.7 meters (12 feet), or approximately 21%. Views of the widened freeway would be experienced by pedestrian and vehicular users on Fifth Street looking north and by vehicular users of the mainline freeway.

Under Alternatives Three and Five, Davis Street, between Clay and Washington Streets, would be reopened and would have two lanes of southbound traffic. Views experienced by pedestrian and vehicular users of the reopened street would still be obstructed by the embankment to the east of Davis Street, although some modification of the embankment would occur during construction. For users of the elevated pedestrian walkway over Davis Street and of the open space east of the embankment, views to the east would be similar to existing conditions, with waterfront development and the towers of the Bay Bridge visible to the east.

For at-grade vehicular users along Clay and Washington Streets, and of the reopened Davis Street, views into and through Davis Street would be more open than currently exist. For pedestrians on Clay and Washington Streets, and occupants of surrounding buildings, all of the project alternatives would provide better views of the City than under pre-earthquake conditions.

Under all build alternatives, the proposed traffic improvements on First Street would require overhead signs across First Street for lane use control during different time periods of the day. The overhead signs would be visible to motorists, pedestrians and neighbors in the area, but would not obstruct any scenic views along First Street.

By the year 2015, it is assumed that other related projects in the area would be in place. These projects, which include the MUNI F-Line, MUNI Metro Turnback and the reconfiguration of the MUNI bus layover lot, would each introduce new visual elements into the environment. The MUNI F-Line would introduce overhead electrification lines and support poles along the median of The Embarcadero, north of Mission Street. The exit portal for the MUNI-Metro Turnback would be seen from the proposed Rincon Point Park. The demolition of the Embarcadero Freeway and the Terminal Separator Structure created newly available building sites along the right-of-way of these former facilities. Structures on these sites could be substantially taller and more visually dominant than the pre-earthquake freeway structures. Future environmental studies for any proposed structures on these sites would be likely to analyze potential visual quality and urban design impacts of these projects.

With all build alternatives, construction of the roadway improvements would temporarily affect the visual environment during the estimated 20-21 months construction period. Primary visual changes would include the presence of heavy equipment, safety barriers, stockpiled soil, and construction materials. Grading would expose bare earth and would temporarily disrupt landscaped areas within project right-of-way.[10]

4.3 URBAN DESIGN

Under all of the alternatives, the areas left vacant by the demolition of the Embarcadero Freeway and Terminal Separator Structure would provide urban design and open space opportunities not available under pre-earthquake conditions.

Under Alternatives Two, Three, and Four, construction in the Mid-Embarcadero area would widen most pedestrian areas and provide additional opportunities for incorporation of urban design amenities, such as landscaping, lighting and public art, into the roadway median and into widened pedestrian spaces. A continuous promenade would be provided between Folsom Street and Broadway on the eastside of the roadway. The promenade would be widened between Howard Street and the Agriculture Building from a range of 3.8-5.2 meters (12.5 -17 feet) to approximately 7.6-15.2 meters (25-50 feet). In front of the Ferry Building, a 33.3 meters (110 feet) wide pedestrian space would be created. North of the Ferry Building to Broadway, the promenade would be widened from between 4.5-5.2 meters (15-17 feet) under pre-earthquake and existing conditions to 7.6-11 meters (25-35 feet). Westside sidewalks, which varied in width between 3-7 meters (10-22 feet) in pre-earthquake and existing conditions, would be 4.5 meters (15 feet) wide, except at just south of Broadway where the sidewalk would be 1.8 meters (6 feet) wide. The realigned roadway would make available approximately one-tenth hectare (one-quarter acre) of area between the roadway and the eastern edge of Justin Herman Plaza and Assessor's Block 202 .

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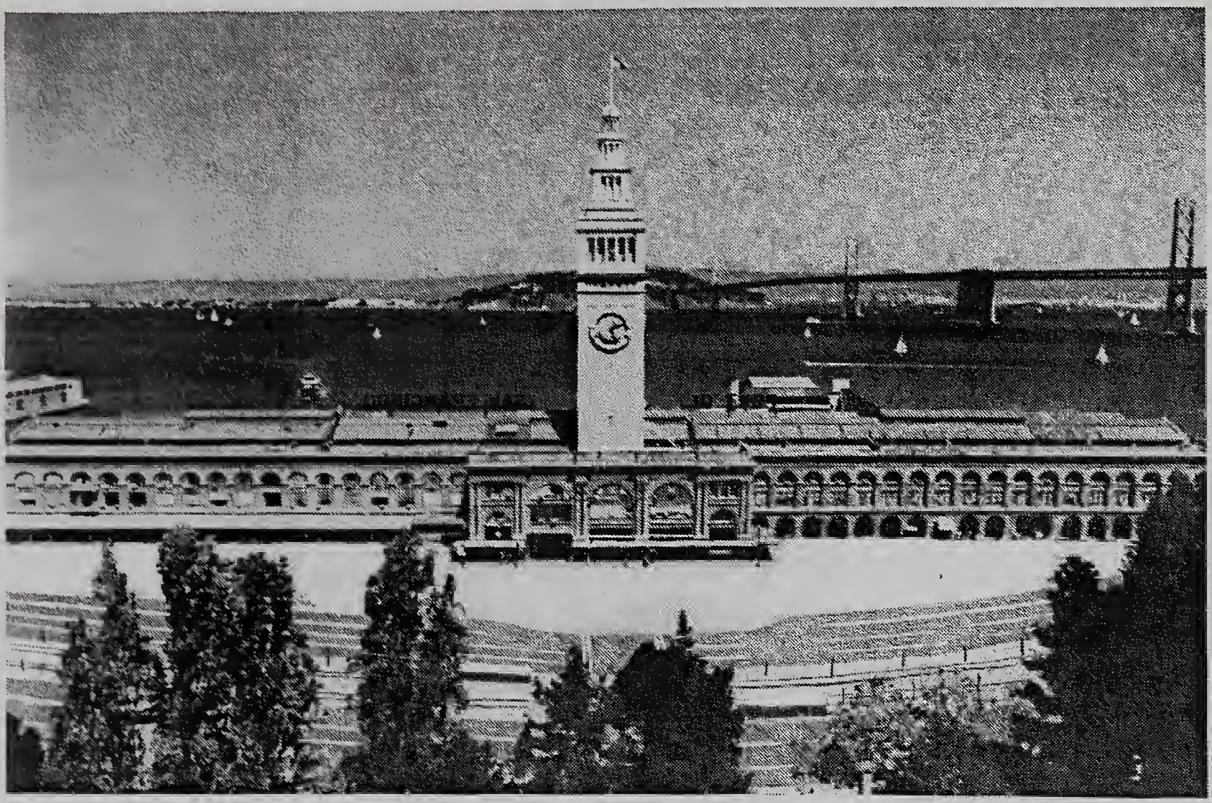
[10] For more details of project impacts on visual quality, please see the Visual Quality and Urban Design Background Report. A copy of this report is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

Construction under Alternative Five would be similar to Alternatives Two, Three, and Four, except for the area directly in front of the Ferry Building where the northbound lanes would be straightened and the southbound lanes of The Embarcadero would curve into Justin Herman Plaza, enlarging the median. At the widest part of the southbound curve, the Embarcadero alignment would be shifted approximately 18 meters (60 feet) westward of its current alignment and would cut into the current boundaries of the Plaza. As in the other build alternatives, the parking lots in front of the Ferry Building would be removed, adding to the width of the promenade. Unlike the other build alternatives, which add to pedestrian spaces next to Justin Herman Plaza and the Ferry Building, the open space created with Alternative Five would be between the Embarcadero north and southbound roadways. In front of the Ferry Building, the promenade would be widened to 18 meters (60 feet). (Figure 4.3-1 shows the general appearance of Alternative Five if a MUNI F-Line turn-around was accommodated in the proposed plaza. Additional F-Line features would include disabled accessible boarding platforms and overhead lines.) The mitigation section below, and the Draft Section 4(f) Evaluation, describe the configuration of "Mitigated Alternative Five", which would avoid encroaching on Justin Herman Plaza.

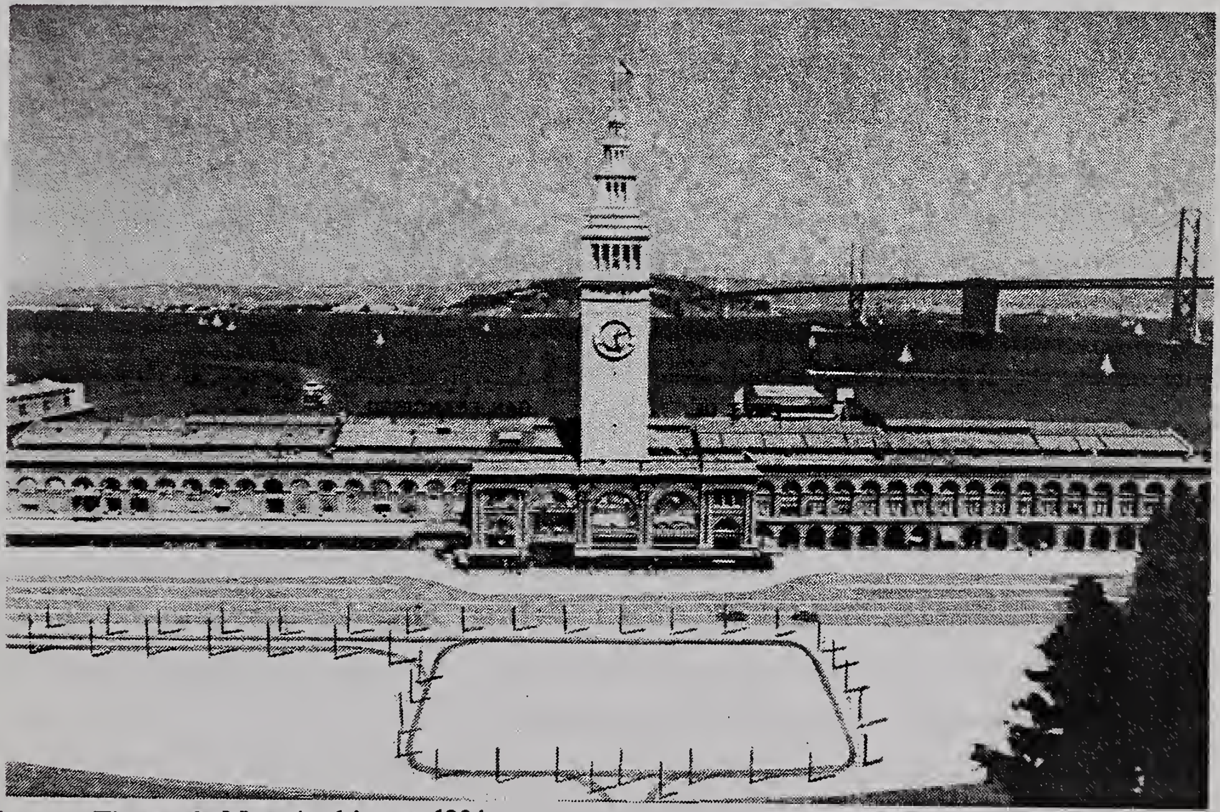
Between Howard and Folsom Streets, all of the build alternatives would realign The Embarcadero to match the South Embarcadero alignment and to create the planned Rincon Point Park. Under the No Build Alternative, this realignment would have to be accomplished by a separate project.

Under the Second Street Option of Alternatives Three and Five, a new off-ramp would be constructed from I-80 eastbound to Second Street. The appearance of the new off-ramp, while not substantially obtrusive within the context of pre-earthquake and existing structures in the vicinity, would be enhanced through the use of street trees or landscaping to screen the off-ramp, and/or the incorporation of murals, bas relief, etc., into the ramp design. (See mitigation section on p. 238.)

The Fourth Street Option of Alternatives Three and Five would modify the existing Fourth Street off-ramp to provide two dedicated lanes from I-80 that flare to four lanes at Fourth Street. This would require removal of an approximately 3.7 meter by 30 meter (12 feet by 100 feet) portion of existing landscaping. While this change would most likely be unnoticeable to all but those most familiar with the area, the widened ramp appearance would be enhanced by replacement



Source: Finger & Moy Architetects, 1994



Source: Finger & Moy Architects, 1994

92.202E & 94.060E ALTERNATIVES TO REPLACEMENT OF THE EMBARCADERO FREEWAY AND THE TERMINAL SEPARATOR STRUCTURE	LOOKING EAST FROM THE 16TH FLOOR OF HYATT REGENCY TOWARDS FERRY BLDG. GENERAL APPEARANCE, ALTERNATIVES 2, 3, AND 4 (TOP); ALTERNATIVE 5 (BOTTOM)	Figure 4.3-1

of landscaping as feasible following construction and/or the placement of street trees in the vicinity. (See mitigation section below.)

Under Alternatives Three and Five, Davis Street between Clay and Washington Streets would be reopened, and would have two lanes of southbound traffic. This would increase the amount of paved surface and decrease the amount of landscaped open space. Several trees in the Davis Street right-of-way near Clay Street would be removed. As currently designed, the project would provide an equivalent amount of land along the Embarcadero corridor and adjacent to Assessor's Block 202 (land left vacant by demolition of the former on- and off-ramps) for development as public open space, resulting in no net change in the amount of landscaped open-area in the vicinity.

Under all build alternatives, the proposed modification of the Drumm Street median to accommodate a left-turn pocket to Clay Street would constitute a minor change, as would the potential elimination of the Washington Street median strip between Drumm Street and The Embarcadero.

Visual Quality and Urban Design Mitigation Measures

- To avoid the intrusion into Justin Herman Plaza that would occur under Alternative Five, the City would realign the roadway under this alternative so that the western curb of the Embarcadero roadway would abut but not encroach on the Plaza. (See Figure 4.1-5.) This realignment would eliminate the potential land use impact and would reduce the potential size of the plaza area proposed between the northbound and southbound lanes, effectively eliminating the possibility of an F-Line turn-around loop within the plaza. Other characteristics and potential impacts of the resulting roadway would be similar to Alternative Five as originally proposed.

- To enhance the appearance of the new off-ramp proposed at Second and Stillman Streets under the Second Street Option of Alternatives Three and Five, the City would plant street trees or other landscape features along the new ramp and/or incorporate public art work such as a mural or bas relief into the ramp design.

- To enhance the appearance of the modified off-ramp at Fourth and Bryant Streets proposed under the Fourth Street Option of Alternatives Three and Five, the City would replace the landscaping that would be removed to achieve proposed modifications, and/or plant street trees in the vicinity.

4.4 LIGHT AND GLARE

Under all project alternatives, effects from automobile headlights would be similar to existing conditions. Since the removal of the freeway, more automobile headlights at the level of the present surface roadway shine at the pedestrian level. Though traffic volumes in the area are projected to increase above existing levels by 2015, and related projects in the Embarcadero corridor, such as the MUNI F Line, are expected to be completed, the increase in glare from vehicle headlights is not expected to exceed amounts commonly accepted in urban areas.

Street lighting is a secondary source of glare. Throughout the project area, the level of lighting achieved would be more consistent than at present or under pre-earthquake conditions because current guidelines for effective lighting of urban roadways and pedestrian spaces, developed by the Illuminating Engineers Society (IES), would establish the design criteria.

By conforming with appropriate Illuminating Engineers Society (IES) guidelines for the selected alternative, a proper ambient light level would be established. Likewise, IES guidelines for glare cutoff would be a basis for the selection of luminaires with photometric characteristics appropriate for the urban environment. The street lighting (including color and level) along The Embarcadero would be consistent along the entire length of the project area with the lighting used for the North and South Embarcadero improvements. By extending the street lighting established by the Waterfront Promenade with luminaires selected to limit upward glare, present conditions would be improved and adequate lighting for vehicle and pedestrian safety would be provided. This strategy would enhance security as well as visual comfort for pedestrians. Proper artificial lighting below the ramps, proposed in Alternatives Three, Four and Five, would be provided for visual and security reasons.

During construction, the light and glare impacts of building activity should be relatively limited. However, if scheduling and traffic management require work at night, glare from temporary lighting could become an issue, particularly for residents of the area. To mitigate this potential effect, construction crews would be required to direct any lighting for nighttime or early morning construction away from traffic, as well as from residential areas. (See mitigation section below.)

Light and Glare Mitigation Measure

- To prevent or reduce glare from temporary lighting during construction periods, the City would require project contractors to divert any lighting for nighttime or early morning construction away from traffic and residential areas.

4.5 TRANSPORTATION

4.5.1 TRAFFIC

Future Travel Forecasts

The regional MTC travel demand model was utilized to develop future macro-scale travel forecasts for the different roadway alternatives. The model is able to quantify shifts in travel patterns due to changes in the roadway configuration (i.e.: the removal of the Embarcadero Freeway, closure of the TSS, construction of new on- and off-ramps, etc.), changes in land uses within the study area and/or the surrounding vicinity, as well as changes in modal split (auto vs. transit) due to anticipated improvements to transit access to the area, as well as other factors such as traffic congestion and parking cost.

In the first step, an overall macro-scale year 2015 travel forecast was established for the study area under each alternative[11]. Regional and study area daily, AM and PM peak hour person trips by trip purpose were estimated for each project alternative, along with their directional distribution and their travel modes. To complete the macro-scale forecast, the five future alternatives analyzed in this study were arranged in two groups according to their similarity in impact on land development potential, future roadway configuration and regional travel patterns:

The first group (No Build Alternative, Alternative Two and Alternative Four) has the highest land use development potential in the immediate study area, because less land would be devoted to freeway structures.

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[11] The 2015 travel forecast was accomplished by adjusting the MTC travel model which utilizes ABAG's 1992 revised projections for 2010, to reflect reasonable growth anticipated in the primary study area by 2015. As explained in Section 4.1.3, ABAG's 1992 projections are larger than the 1994 projections, and this analysis is therefore conservative (i.e. it analyzes more trips than are currently anticipated).

The second group (Alternatives Three and Five) has the same potential for land use development in the immediate study area as the previous group, but includes some major roadway improvements (Second Street/Harrison Street on-ramp, Second Street off-ramp, and widening of the Fourth Street off-ramp).

Differences in network configuration are directly related to the area's accessibility and future travel demand, making each of these two groups intrinsically different from the other. Regional travel patterns for trips going in and out of the downtown area are affected by network configuration, which, also influences mode choice (auto vs. transit) and through trips (those which do not start or end within the study area). The following points summarize the major results of the macro-scale 2015 travel forecast:

- In 2015, daily person trips attracted to and generated from the downtown study area would be 23% greater than existing for all the alternatives, with a slight increase in daily transit mode share (from 52% existing to 55% in 2015).
- All future alternatives show a net increase in the total number of vehicles entering or leaving the study area, when compared against the existing volumes. The total increase is approximately 18% for the AM peak hour, and 10% for the PM peak hour. The lower increase during the PM peak hour is due to the fact that the roadway system currently operates closer to capacity (more vehicles on the street network) during the PM peak period than it does during the AM peak, therefore allowing for a lower net increase.
- Through trips, which are those crossing the study area with both their origin and destination outside the study area, would account for approximately 60% of all future traffic on the downtown street network. Of these through trips, between 54% (AM peak hour) and 75% (PM peak hour) are destined to or originate within the remainder of the northeast San Francisco quadrant (Chinatown, North Beach, Fisherman's Wharf, Mission Bay and Civic Center). There are minor variations between the alternatives in the total volumes of travel to/from those areas due to various differences in mode choice, travel times, and route choice.

To refine results of the macro-scale 2015 travel forecast, a manual assignment of AM and PM peak hour vehicle trips to the street and highway network within the study area was performed. The specific techniques employed in this manual adjustment to the MTC model results are described in a separate technical paper; and generally considered the location of parking areas, optimum routes to and from screenline locations, and previously projected volumes at some screenline locations.[12] The results from this micro-scale step provided the basis for a traffic impact analysis (levels of service, delays and queues) and operational assessment of the various alternatives analyzed in this study. This impact analysis and operational assessment, which is summarized below, utilized the NETSIM traffic simulation model.

Traffic Operations

Operating Statistics

Table 4.5-1 presents surface street network-wide statistics for the streets in the primary study area during the AM and PM peak hours for all project alternatives.

During the AM peak hour, the number of vehicles accessing the study area under all alternatives would decrease compared to pre-earthquake conditions, and would increase compared to existing conditions. This number would reach a maximum of 52,160 vehicles under Alternatives Three and Five, approximately 5% lower than pre-earthquake conditions. The decrease in the number of vehicles from pre-earthquake conditions is due to the fact that drivers have found alternative routes to their destinations, which no longer take them through the study area. Some mode shift from automobile to transit, which provides an alternative form of transportation to downtown San Francisco, has also occurred after the earthquake.

Vehicle-miles of travel during the AM peak hour would be higher for all alternatives compared to existing or pre-earthquake conditions. Alternatives Two and Four would have a similar number of vehicle-miles of travel to the No Build Alternative. Alternatives Three and Five would have lower mileage values because of the closer access they offer to and from the U.S. 101 freeway by means of the Second Street ramps. The increase in vehicle-miles of travel between existing and future conditions would occur because more vehicles would access the study area in the year 2015. Furthermore, the distances that vehicles would cover on City streets would also be longer under future conditions than pre-earthquake, when the Embarcadero Freeway and the TSS delivered at multiple points in the study area.

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[12] TSS/MID-Embarcadero preliminary transportation analysis methodology, Korve Engineering, Inc., November 29, 1993. A copy of this report is available for public review in the project case file at San Francisco Planning Department, 1660 Mission Street, San Francisco.

Table 4.5-1

PRIMARY STUDY AREA, STREET NETWORK STATISTICS COMPARISON BETWEEN ALTERNATIVES AM AND PM PEAK HOURS

MEASURE OF EFFECTIVENESS	Pre-quake	1993 Existing	2015 ALT. 1	2015 ALT. 2	2015 ALT. 3a	2015 ALT. 3b	2015 ALT. 4	2015 ALT. 5a	2015 ALT. 5b
AM PEAK HOUR									
VEHICLES ENTERING+EXITING	54,870	45,110	51,240	51,240	52,160	52,160	51,650	52,160	52,160
VEHICLE-MILES TRAVELED	33,920	35,590	40,150	40,250	38,990	38,760	40,560	38,990	38,760
VEHICLE-HOURS TRAVELED	2,390	2,310	2,890	2,790	2,840	2,780	2,840	2,840	2,780
MOVING TIME/ TRAVEL TIME	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6
AVERAGE SPEED (mph)	14	15	14	14	14	14	14	14	14
PM PEAK HOUR									
VEHICLES ENTERING+EXITING	59,720	50,330	55,120	55,120	56,650	56,650	55,740	56,650	56,650
VEHICLE-MILES TRAVELED	37,420	40,230	44,120	44,110	43,850	43,800	44,240	43,850	43,800
VEHICLE-HOURS TRAVELED	3,730	2,890	3,300	3,310	3,328	3,300	3,340	3,328	3,300
MOVING TIME/ TRAVEL TIME	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6
AVERAGE SPEED (mph)	10	14	13	13	13	13	13	13	13

Source: Korve Engineering, Inc.

The moving time vs. travel time ratio for the AM peak hour would be slightly lower (worse) under all build alternatives, as compared to pre-earthquake and existing conditions, due to increased congestion. All build alternatives would have very similar values (0.6), and the No Build Alternative would have the same value (0.7) as pre-earthquake and 1993 existing.

All alternatives would have lower than existing average speed values during the AM peak hour, and would have approximately the same values as under pre-earthquake conditions.

The PM peak hour surface street statistics, also presented in Table 4.5-1, are generally very similar to those for the AM peak hour described above. The number of vehicles accessing the primary study area would increase over existing volumes under all project alternatives, and would reach a maximum of 56,650 under Alternatives Three and Five, approximately 5% lower than in 1989 (pre-earthquake conditions).

All alternatives would have similar vehicle-miles of travel during the PM peak hour, although Alternatives Three and Five would provide shorter access by means of the new Second Street ramps, and would show a marginal decrease in vehicle-miles traveled.

All alternatives, including the No Build, would result in an approximately 15% increase in total vehicle-hours from existing conditions.

The PM peak hour moving time vs. travel time ratio would be slightly lower (worse) under all build alternatives compared to existing conditions, but would be the same as pre-earthquake conditions. The No Build Alternative would have the same values as existing conditions, but would be better than pre-earthquake conditions.

All alternatives would have lower PM peak hour average speed than existing conditions, but would have higher average speed than pre-quake. The difference among all alternatives would be less than 0.8 km/h (0.5 mph).

Study Area Level of Service

Operating characteristics of intersections are often described by use of the concept of level of service (LOS). LOS is a qualitative description of an intersection's performance based on traffic delays. An intersection's LOS could range from A, representing free-flow conditions, to F, representing jammed conditions. Levels of service A through D are generally considered acceptable in an urban environment, while level of service E or F is considered unacceptable. Appendix C presents the relationship between average delay and its corresponding LOS designation.

Table 4.5-2 presents the projected LOS conditions for the primary study area intersections during the AM and PM peak hours. Localized future traffic congestion would occur at the same locations as exists today, but with longer delays and worse levels of service. Battery Street, First Street, Harrison Street, Second Street, Third Street, and Fourth Street, which provide access to and from the freeway, would be the most affected City streets. Alternatives Three and Five would create slightly worse AM and PM peak hour congestion on First Street, Harrison Street and Fourth Street, because the existing Fourth Street westbound on-ramp would become a freeway merge lane with the addition of the new Harrison Street/Second Street westbound on-ramp.

Figures 4.5-1 through 4.5-5 present the intersections in the primary study area with LOS condition D or worse during the AM peak hour. As shown in Table 4.5-2, traffic conditions during the AM peak hour would be similar for all alternatives under pre-earthquake, existing and future 2015 conditions, with some exceptions. In general, most of the intersections analyzed would not change LOS substantially under any future alternative, with the exception of seven intersections that would degrade their existing LOS, as described below:

- LOS at the intersection of Folsom Street and Fremont Street would degrade from existing LOS C to LOS C/D under Alternatives Three, Four and Five because of the proposed change from the current two-phase signal to a three-phase signal[13]. The LOS degradation would be more noticeable (LOS D) under the Second Street Option of Alternatives Three and Five, which would have higher volumes on Folsom Street coming from the I-80 eastbound Second Street off-ramp.

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[13] Inbound traffic coming from the off-ramp would have a free (no stop) left turn onto Fremont Street northbound, similar to the existing configuration.

TABLE 4.5-2
SIGNALIZED INTERSECTION LOS SUMMARY
PRIMARY STUDY AREA
AM AND PM PEAK HOUR

INTERSECTION	PRE-QUAKE		1993 EXISTING		2015 ALT 1		2015 ALT 2		2015 ALT 3A		2015 ALT 3B		2015 ALT 4		2015 ALT 5A		2015 ALT 5B	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Harrison & First	B	F	A	B	A	B	A	B	A	C	A	B	A	B	A	C	A	B
Harrison & Fremont	B	B	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
Harrison & Main	N/A	N/A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Harrison & Spear	N/A	N/A	N/A	N/A	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Harrison & Essex	B	E	A	C	A	C	A	C	B	E	B	D	A	B	B	E	B	D
Folsom & First	B	B	A	B	A	B	B	B	C	B	A	B	B	B	C	B	A	B
Folsom & Fremont	C	B	C	B	C	B	B	B	D	B	C	B	D	B	D	B	C	B
Folsom & Beale	A	A	A	A	A	B	A	B	B	B	B	B	C	B	B	B	B	B
Folsom & Main	N/A	N/A	B	B	B	B	B	B	B	A	B	A	B	A	B	A	B	A
Folsom & Spear	N/A	N/A	N/A	N/A	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Folsom & Steuart	N/A	N/A	N/A	N/A	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Howard & First	B	B	B	B	B	B	B	B	B	C	B	C	B	B	B	C	B	C
Howard & Fremont	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Howard & Beale	B	B	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
Howard & Main	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Howard & Spear	N/A	N/A	N/A	N/A	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Howard & Steuart	N/A	N/A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Mission & First	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Mission & Fremont	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Mission & Beale	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Mission & Main	E	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Mission & Spear	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	A
Mission & Steuart	N/A	N/A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Market & Sansome	A	A	A	A	A	A	A	A	A	B	A	B	A	A	A	B	A	B
Market & Battery	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Market & Fremont	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Market & Beale	B	C	B	B	B	B	B	B	B	B	A	B	B	B	B	B	A	B

Note: N/A (Not Applicable) Denotes Unsignalized Intersection - Source: Korve Engineering, Inc.

TABLE 4.5-2 (continued)
SIGNALIZED INTERSECTION LOS SUMMARY
PRIMARY STUDY AREA
AM AND PM PEAK HOUR

INTERSECTION	PRE-QUAKE		1993 EXISTING		2015 ALT 1		2015 ALT 2		2015 ALT 3A		2015 ALT 3B		2015 ALT 4		2015 ALT 5A		2015 ALT 5B	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Market & Main	E	F	C	B	C	D	C	D	C	C	C	D	D	D	C	C	C	D
Sansome & Bush	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sansome & Pine	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sansome & California	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sansome & Sacramento	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sansome & Clay	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sansome & Washington	A	B	B	A	B	B	B	A	B	A	B	B	B	A	B	A	B	B
Sansome & Jackson	B	B	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
Sansome & Pacific	B	E	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sansome & Broadway	D	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Battery & Bush	D	E	E	F	E	F	E	F	F	F	F	F	E	F	F	F	F	F
Battery & Pine	B	A	B	B	C	B	C	B	B	B	C	B	B	B	B	B	C	B
Battery & California	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Battery & Sacramento	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Battery & Clay	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Battery & Washington	B	B	A	B	B	B	A	B	B	A	A	B	A	B	B	A	A	B
Battery & Jackson	B	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Battery & Pacific	A	B	A	B	A	A	A	A	A	B	A	A	A	A	A	B	A	A
Battery & Broadway	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Front & Pine	B	B	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
Front & California	A	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
Front & Sacramento	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Front & Clay	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Front & Broadway	N/A	N/A	N/A	N/A	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Davis & California	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Davis & Sacramento	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Davis & Broadway	N/A	N/A	N/A	N/A	B	B	A	B	A	B	B	B	A	B	A	B	B	B

Note: N/A (Not Applicable) Denotes Unsignalized Intersection - Source: Korve Engineering, Inc.

TABLE 4.5-2 (continued)
SIGNALIZED INTERSECTION LOS SUMMARY
PRIMARY STUDY AREA
AM AND PM PEAK HOUR

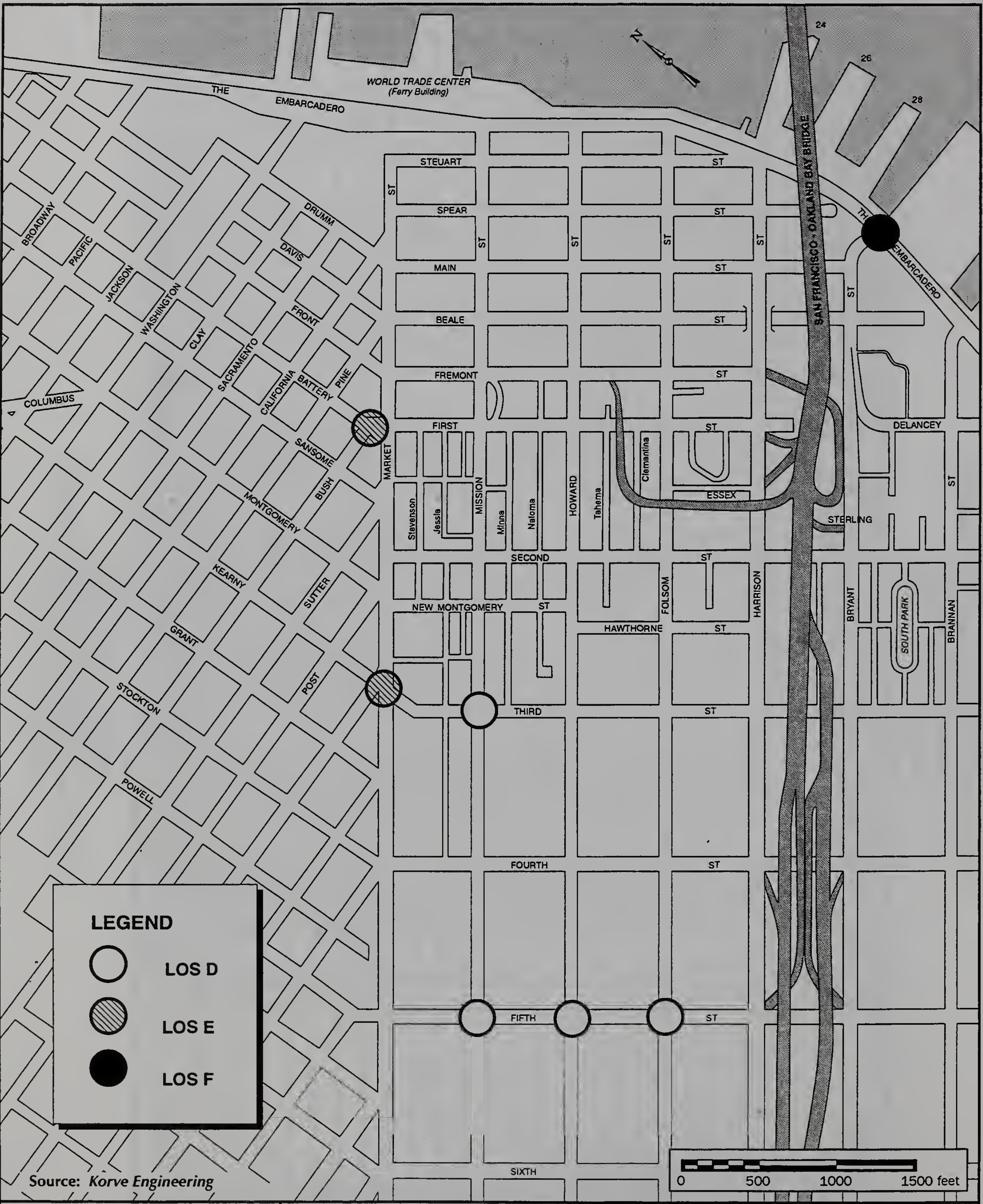
INTERSECTION	PRE-QUAKE		1993 EXISTING		2015 ALT 1		2015 ALT 2		2015 ALT 3A		2015 ALT 3B		2015 ALT 4		2015 ALT 5A		2015 ALT 5B	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Drumm & California	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Drumm & Sacramento	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Drumm & Clay	N/A	N/A	B	B	A	B	B	B	B	B	A	B	B	B	B	B	A	B
Drumm & Washington	N/A	N/A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Second & Brannan	C	F	C	C	C	B	C	B	B	B	C	B	C	B	B	B	C	B
Second & Bryant	B	F	B	D	B	B	B	C	B	B	B	B	B	C	B	B	B	B
Second & Harrison	B	F	B	D	B	D	B	D	B	B	B	B	B	B	B	B	B	B
Second & Folsom	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Second & Howard	B	C	B	B	B	B	B	B	B	B	A	B	A	B	B	B	A	B
Second & Mission	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Second & Market	A	A	A	A	A	B	A	A	A	B	A	B	A	B	A	B	A	B
Bryant & Beale	N/A	N/A	N/A	N/A	B	B	B	B	A	B	B	B	B	B	A	B	B	B
Bryant & Main	N/A	N/A	N/A	N/A	B	B	B	C	A	B	A	B	B	B	A	B	A	B
The Embarcadero & Bryant	N/A	N/A	N/A	N/A	F	F	C	C	C	C	C	B	C	B	C	C	C	B
The Embarcadero & Brannan	N/A	N/A	N/A	N/A	C	C	C	C	C	C	C	C	C	C	C	C	C	C
The Embarcadero & Harrison	N/A	N/A	N/A	N/A	B	B	B	B	B	B	B	B	B	B	B	B	B	B
The Embarcadero & Folsom	N/A	N/A	N/A	N/A	B	B	B	B	C	B	C	B	C	C	C	B	C	B
The Embarcadero & Howard	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A
The Embarcadero & Mission	B	A	B	A	B	B	B	B	A	A	A	B	B	B	A	A	A	B
The Embarcadero & Washington	N/A	N/A	A	A	B	B	B	B	B	C	B	C	B	C	B	C	B	C
The Embarcadero & Broadway	N/A	N/A	B	B	C	C	C	C	C	D	C	D	C	D	C	D	C	D
I-80 EB Off-Ramp @ Second St.	----	----	----	----	----	----	----	----	B	B	----	----	----	----	B	B	----	
New Montgomery & Howard	B	B	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B
New Montgomery & Mission	B	B	B	C	B	C	B	B	B	B	B	B	B	C	B	B	B	B
New Montgomery & Market	B	C	B	C	B	C	B	C	C	C	B	C	C	C	C	C	B	C
Third Street & Brannan	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Third Street & Bryant	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

Note: N/A (Not Applicable) Denotes Unsignalized Intersection - Source: Korve Engineering, Inc.

TABLE 4.5-2 (continued)
SIGNALIZED INTERSECTION LOS SUMMARY
PRIMARY STUDY AREA
AM AND PM PEAK HOUR

INTERSECTION	PRE-QUAKE		1993 EXISTING		2015 ALT 1		2015 ALT 2		2015 ALT 3A		2015 ALT 3B		2015 ALT 4		2015 ALT 5A		2015 ALT 5B	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Third Street & Harrison	B	B	B	B	B	B	B	C	B	C	B	C	B	B	B	C	B	C
Third Street & Folsom	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Third Street & Howard	B	B	B	B	C	B	C	B	B	B	C	B	C	B	B	B	C	B
Third Street & Mission	B	B	B	C	D	C	B	C	B	C	B	C	B	C	B	C	B	C
Third Street & Market	B	B	B	B	E	C	C	B	C	B	C	B	C	B	C	B	C	B
Fourth Street & Brannan	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Fourth Street & Bryant	B	B	C	C	C	C	C	C	B	C	C	C	C	C	B	C	C	C
Fourth Street & Harrison	B	C	B	B	B	E	C	E	F	F	F	F	B	E	F	F	F	F
Fourth Street & Folsom	B	B	B	B	B	E	B	F	D	E	E	E	B	E	D	E	E	E
Fourth Street & Howard	B	B	B	B	B	C	B	D	B	D	B	D	B	D	B	D	B	D
Fourth Street & Mission	B	B	B	B	B	C	B	C	B	C	B	C	B	D	B	C	B	C
Fourth Street & Market	B	B	B	B	B	B	B	B	B	C	B	C	B	C	B	C	B	C
Fifth Street & Brannan	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Fifth Street & Bryant	B	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B
Fifth Street & Harrison	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Fifth Street & Folsom	B	B	B	B	D	B	C	B	C	B	C	B	C	B	C	B	C	B
Fifth Street & Howard	B	B	B	B	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Fifth Street & Mission	A	B	B	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A
Fifth Street & Market	B	B	C	C	C	C	C	D	C	C	C	C	C	C	C	C	C	C
Sixth Street & Brannan	B	D	B	B	B	C	B	C	B	C	B	C	B	B	B	C	B	C
Sixth Street & Bryant	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sixth Street & Harrison	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sixth Street & Folsom	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sixth Street & Howard	B	E	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sixth Street & Mission	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Sixth Street & Market	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

Note: N/A (Not Applicable) Denotes Unsignalized Intersection - Source: Korve Engineering, Inc.



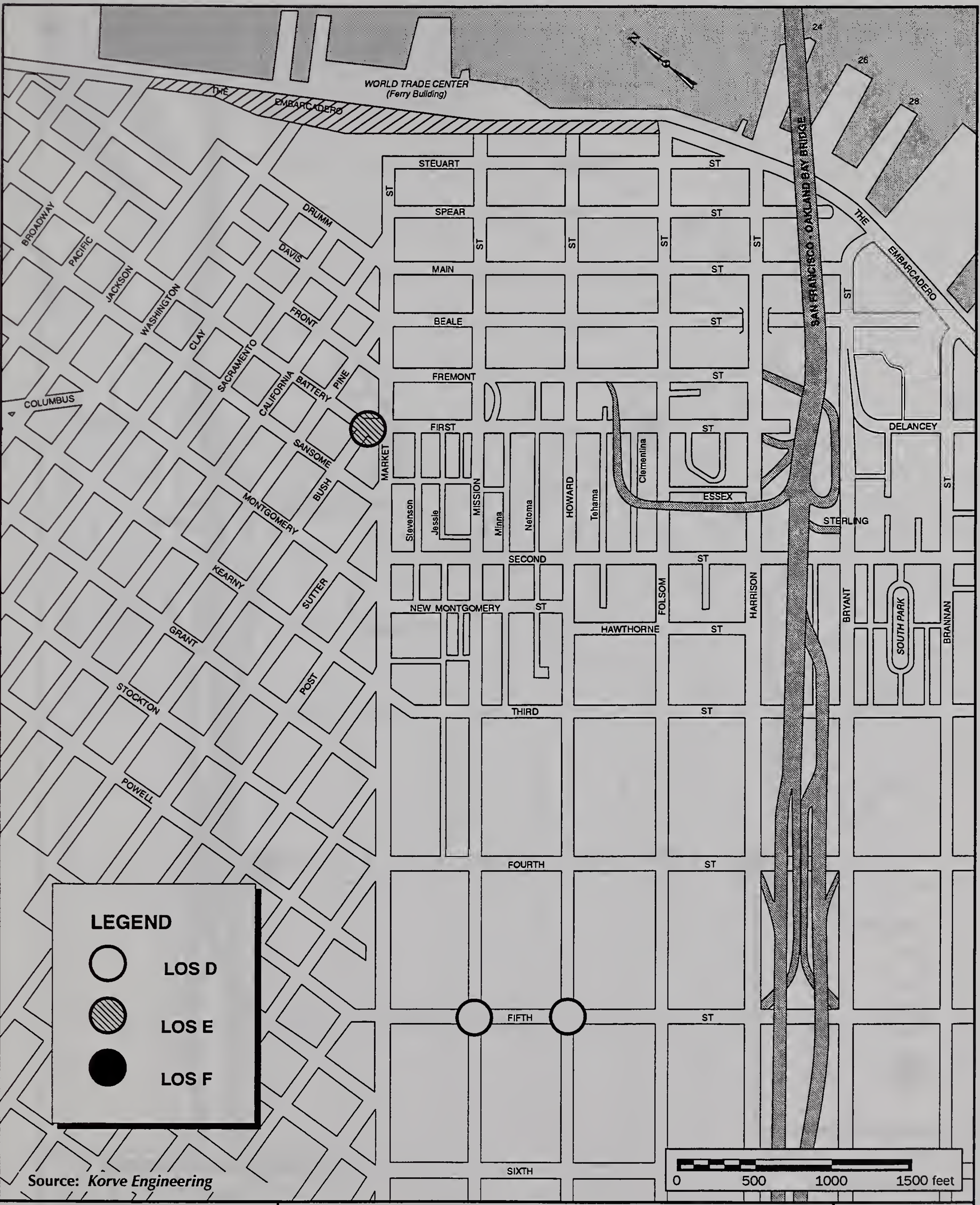
Source: *Korve Engineering*

92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS
NO BUILD ALTERNATIVE 1
Year 2015
AM Peak Hour

Figure 4.5-1



Source: *Korve Engineering*

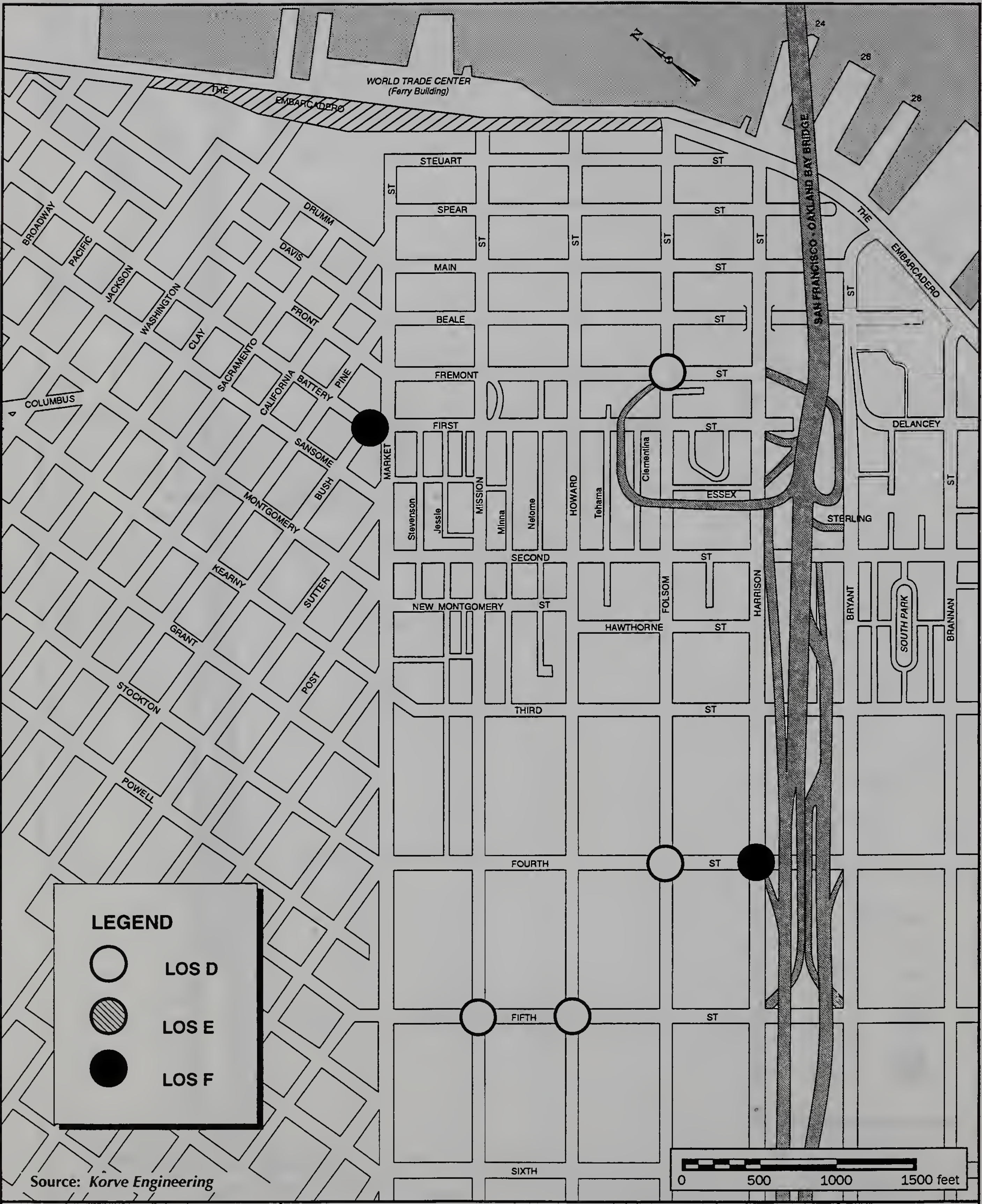
92.202E & 94.060E

Alternatives to Replacement of The Embarcadero Freeway & Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS ALTERNATIVE 2

Year 2015
AM Peak Hour

Figure 4.5-2



Source: *Korve Engineering*

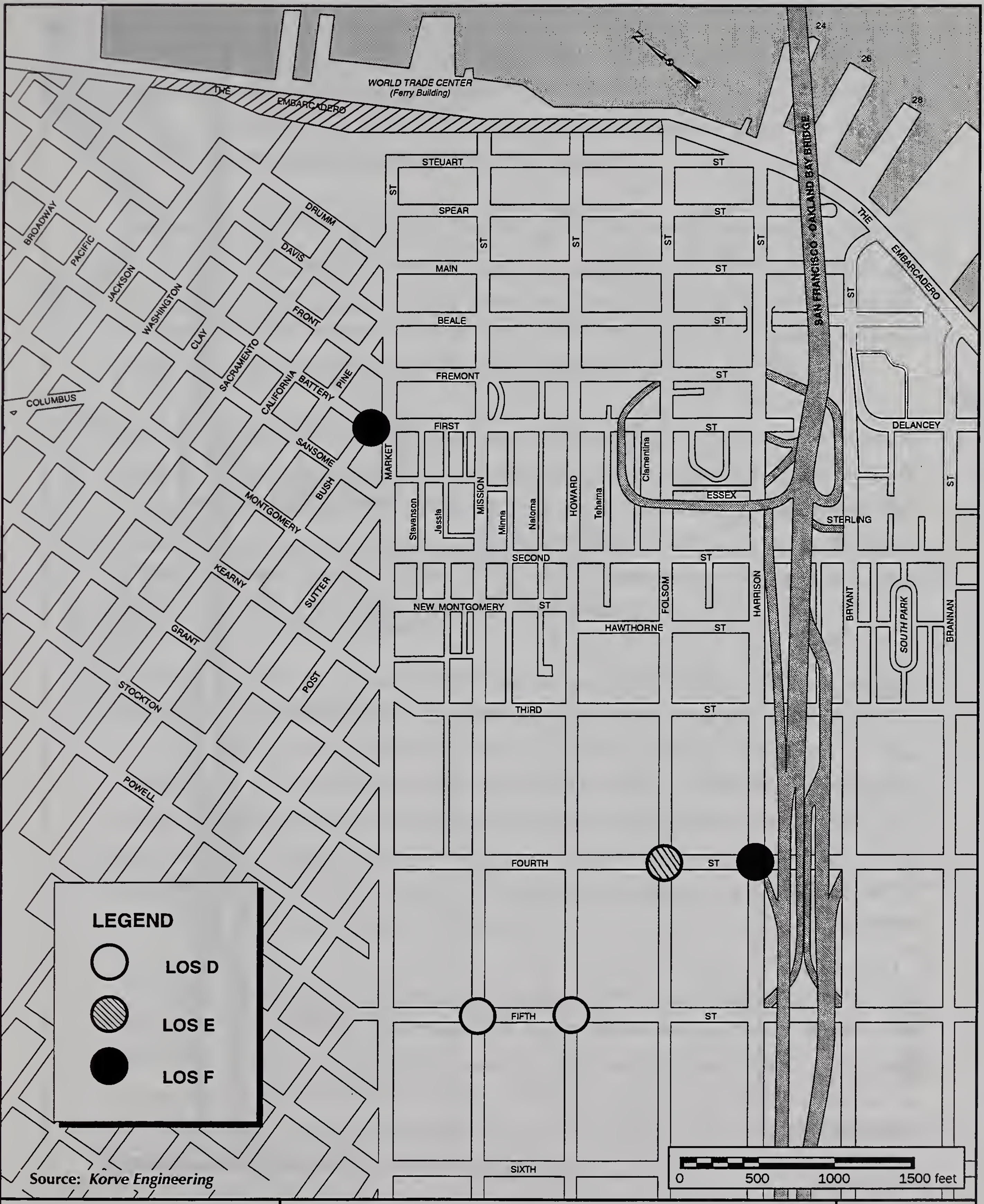
92.202E & 94.060E

Alternatives to Replacement of The Embarcadero Freeway & Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS ALTERNATIVES 3A and 5A

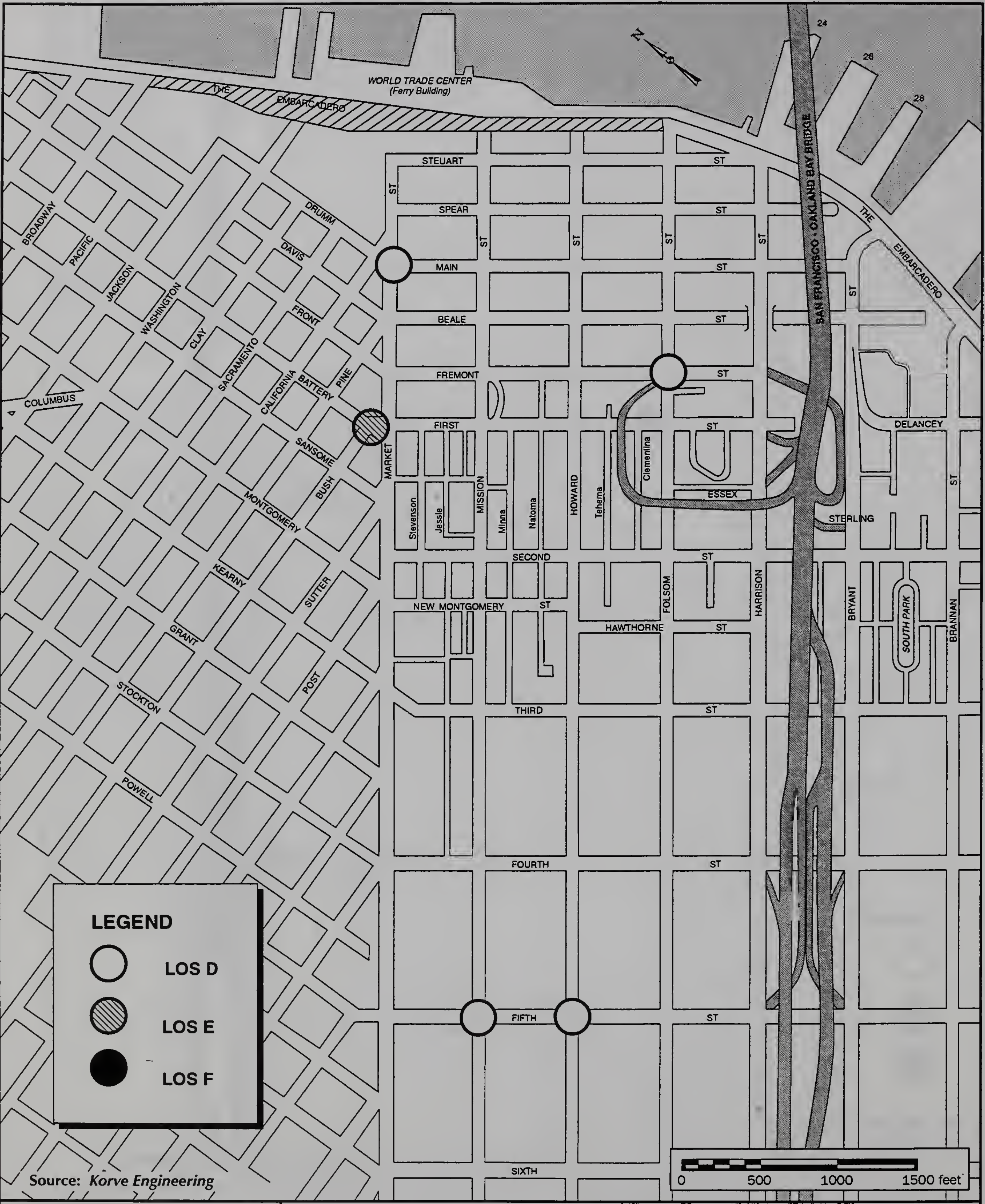
Year 2015
AM Peak Hour

Figure 4.5-3



Source: *Korve Engineering*

92.202E & 94.060E Alternatives to Replacement of The Embarcadero Freeway & Terminal Separator Structure	**LEVEL OF SERVICE CONDITIONS ALTERNATIVES 3B and 5B** Year 2015 AM Peak Hour	Figure 4.5-4



Source: *Korve Engineering*

92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS ALTERNATIVE 4

Year 2015
AM Peak Hour

Figure 4.5-5

- The intersection of Battery Street and Bush Street would degrade from LOS D in pre-earthquake conditions to LOS E and F in future conditions due to an overall increase in traffic. Alternatives Three and Five, with the highest traffic volumes in the network, would show the worst levels of service (LOS F).

- The intersection of The Embarcadero roadway and Bryant Street is projected to experience a LOS F under the No Build Alternative due to long queues on the Bryant Street approach and a shorter stacking area. All build alternatives would incorporate an additional mixed-flow eastbound lane on Bryant Street between Main Street and The Embarcadero, for a total of three lanes (two mixed-flow lanes and one transit lane), thus improving the LOS to C.

- The LOS of Third Street and Market Street intersection is projected to degrade, as compared to pre-earthquake (LOS C) and existing (LOS D) conditions, to LOS E under the No Build Alternative due to overall traffic growth in the study area, with queues on Third Street spilling back to the upstream intersection (Mission Street). All build alternatives would incorporate an additional lane on Third Street between Mission Street and Geary Street, and thus would improve the current LOS D to LOS C.

- LOS at the intersection of Fourth Street and Harrison Street would substantially degrade from pre-earthquake and current conditions under Alternatives Three and Five (from LOS B to LOS F) due to the proposed changes to the Fourth Street southbound on-ramp configuration. It would become a lane-merge into the I-80/U.S. 101 freeway, instead of the existing lane-add, therefore decreasing the on-ramp capacity by approximately 33%. The queues on Fourth Street would spillback to the upstream intersection (Folsom Street) degrading its current LOS from B to D (under the Second Street Option) or E (under the Fourth Street Option) in Alternatives Three and Five.

- LOS at the intersection of Fifth Street and Howard Street would degrade from LOS B in current and pre-earthquake conditions to LOS D under all alternatives. This is due to overall traffic growth and the need to re-time signals on Fifth Street and Sixth Street for a one-way couplet operation assumed in the analysis. The worst condition would occur under the No Build Alternative, where the northbound queues on Fifth Street would spillback, degrading upstream LOS conditions to C or D at Folsom Street.

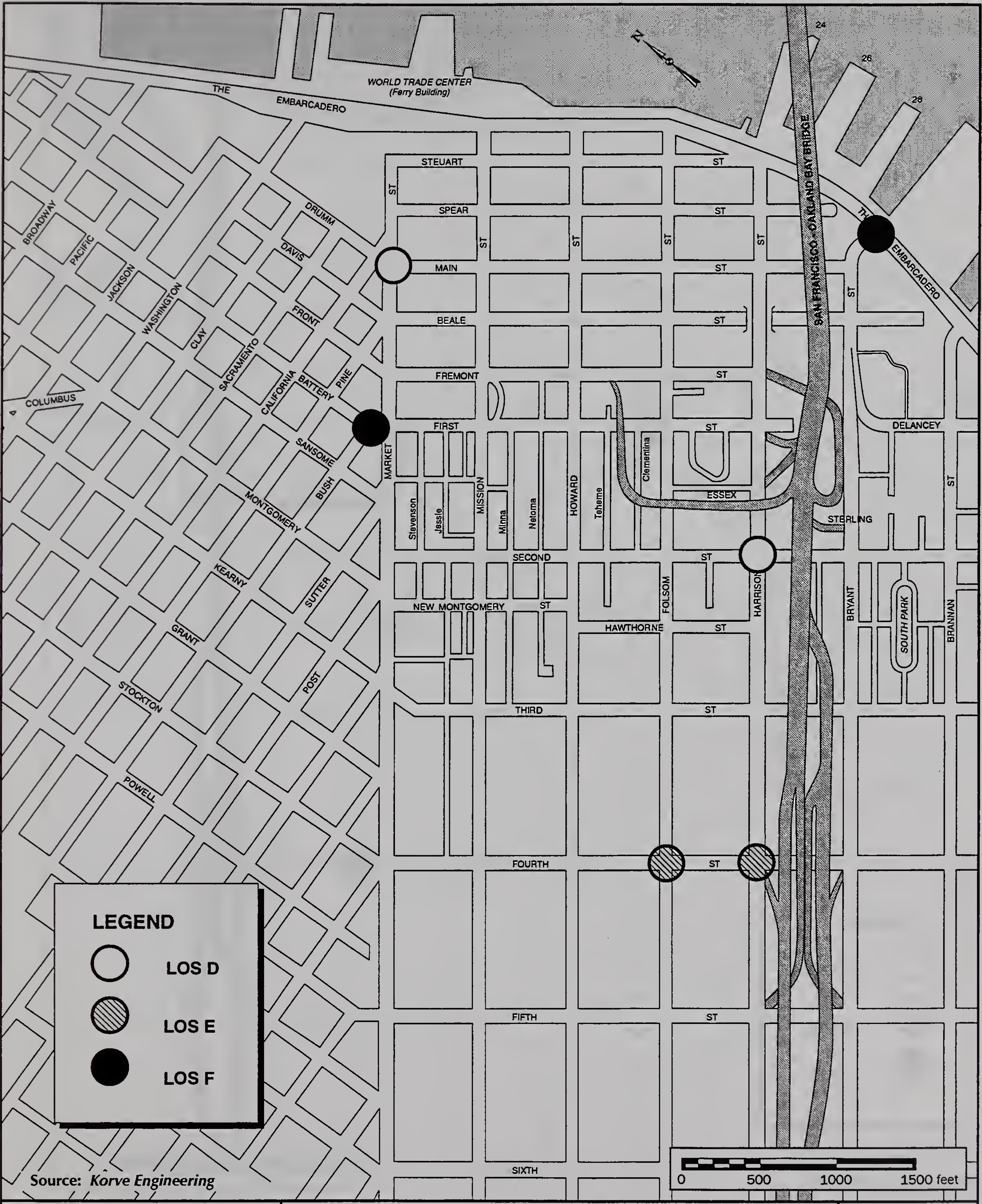
Figures 4.5-6 to 4.5-10 present the intersections in the primary study area with LOS D or worse during the PM peak hour. As shown in Table 4.5-2, traffic conditions during the PM peak hour would be similar for all alternatives under pre-earthquake, existing and future 2015 conditions with the following exceptions:

- LOS at the intersection of Harrison Street and First Street would degrade from current LOS B to LOS C under the Second Street Option of Alternatives Three and Five due to localized congestion in that area caused by the new Second Street on- and off-ramps. Nevertheless, all alternatives would show an improvement over the pre-earthquake condition LOS F. It should be noted, however, that the levels of service indicated along First Street reflect non-incident conditions, that is, when there are no major queues on First Street due to congestion on I-80 or U.S. 101. Given the high volume-to-capacity ratios shown at the First and Essex eastbound on-ramps, the First/Harrison intersection would quickly deteriorate to less than acceptable conditions (LOS E or F) in the case of an incident on the Bay Bridge, or in the case of slightly greater traffic volumes (on the freeway or on local streets) than those estimated in this analysis. A separate section in this report (Incident Analysis) addresses these issues in more depth.

- The intersection of Battery Street and Bush Street would degrade from LOS E in pre-earthquake to LOS F under all alternatives due to growth in traffic. Future LOS at this location under all alternatives would be the same as existing conditions.

- The intersection of Harrison Street at Essex Street would show a worse LOS under Alternatives Three and Five (LOS E or D) when compared to existing conditions (LOS C) due to the new Harrison Street on-ramp, but would not change over pre-earthquake conditions. The increase in delay over existing conditions would be more noticeable under the Second Street Option of both alternatives (LOS E), reflecting higher congestion caused by the new Second Street off-ramp.

- The intersection of the Embarcadero roadway at Broadway would show worse future levels of service over pre-earthquake (LOS A) or existing (LOS B) conditions, especially under Alternatives Three, Four, and Five (all with LOS D), due to higher northbound left turns from the Embarcadero roadway. The No Build Alternative and Alternative Two would show a LOS C.



Source: *Korve Engineering*

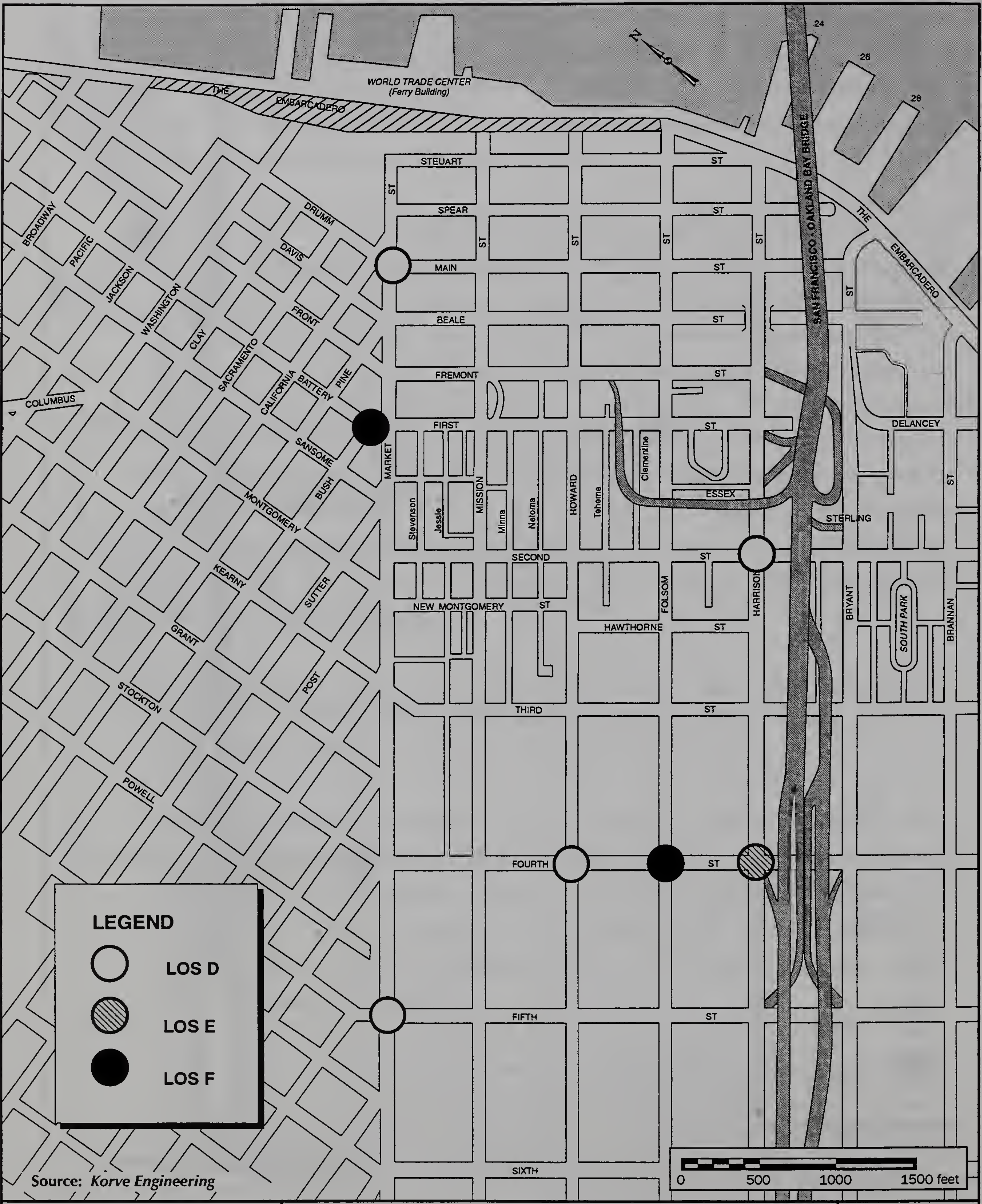
92.202E & 94.060E

Alternatives to Replacement of The Embarcadero Freeway & Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS NO BUILD ALTERNATIVE 1

Year 2015
PM Peak Hour

Figure 4.5-6



Source: *Korve Engineering*

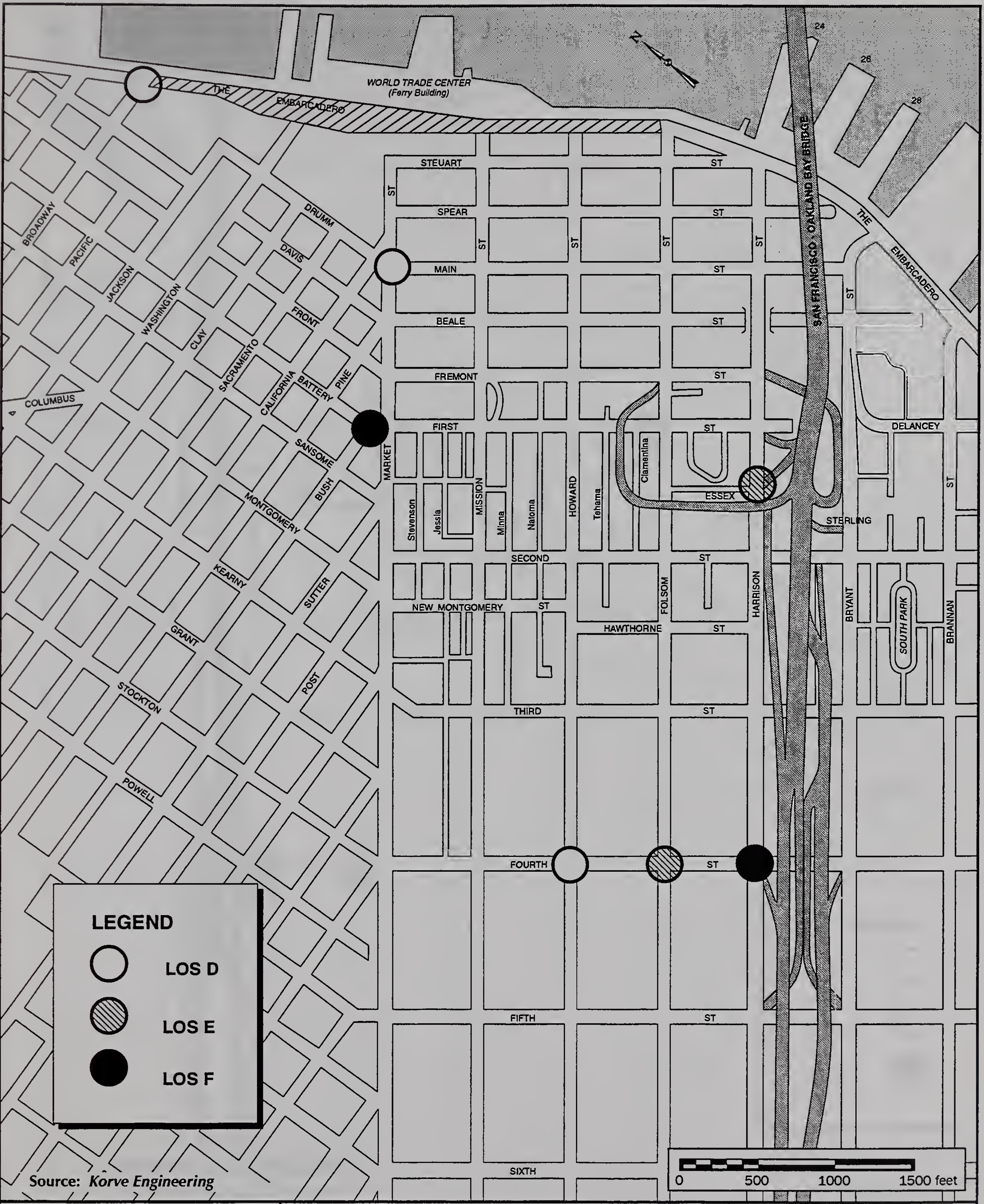
92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS
ALTERNATIVE 2

Year 2015
PM Peak Hour

Figure 4.5-7



Source: *Korve Engineering*

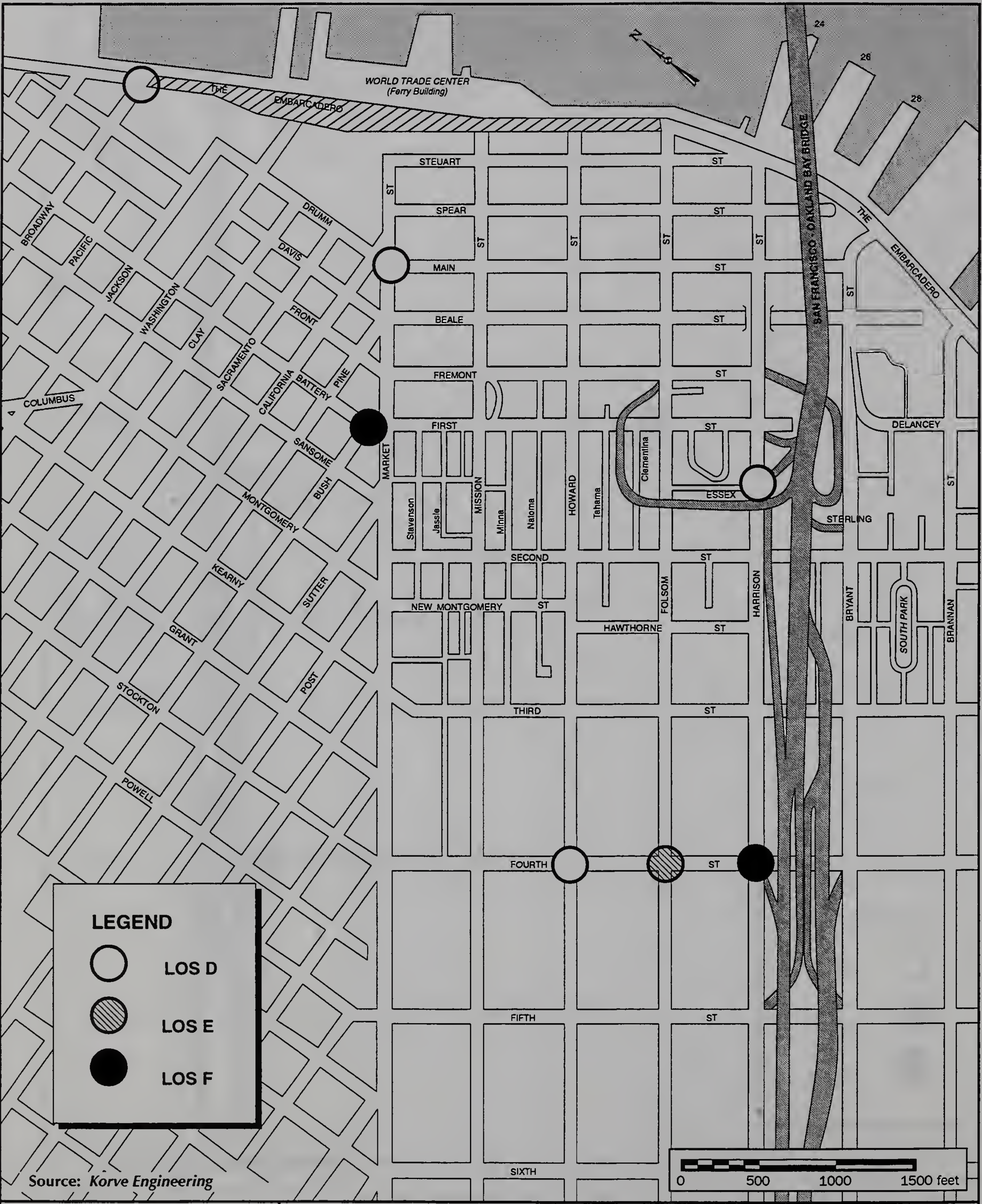
92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS
ALTERNATIVES 3A and 5A

Year 2015
PM Peak Hour

Figure 4.5-8



Source: *Korve Engineering*

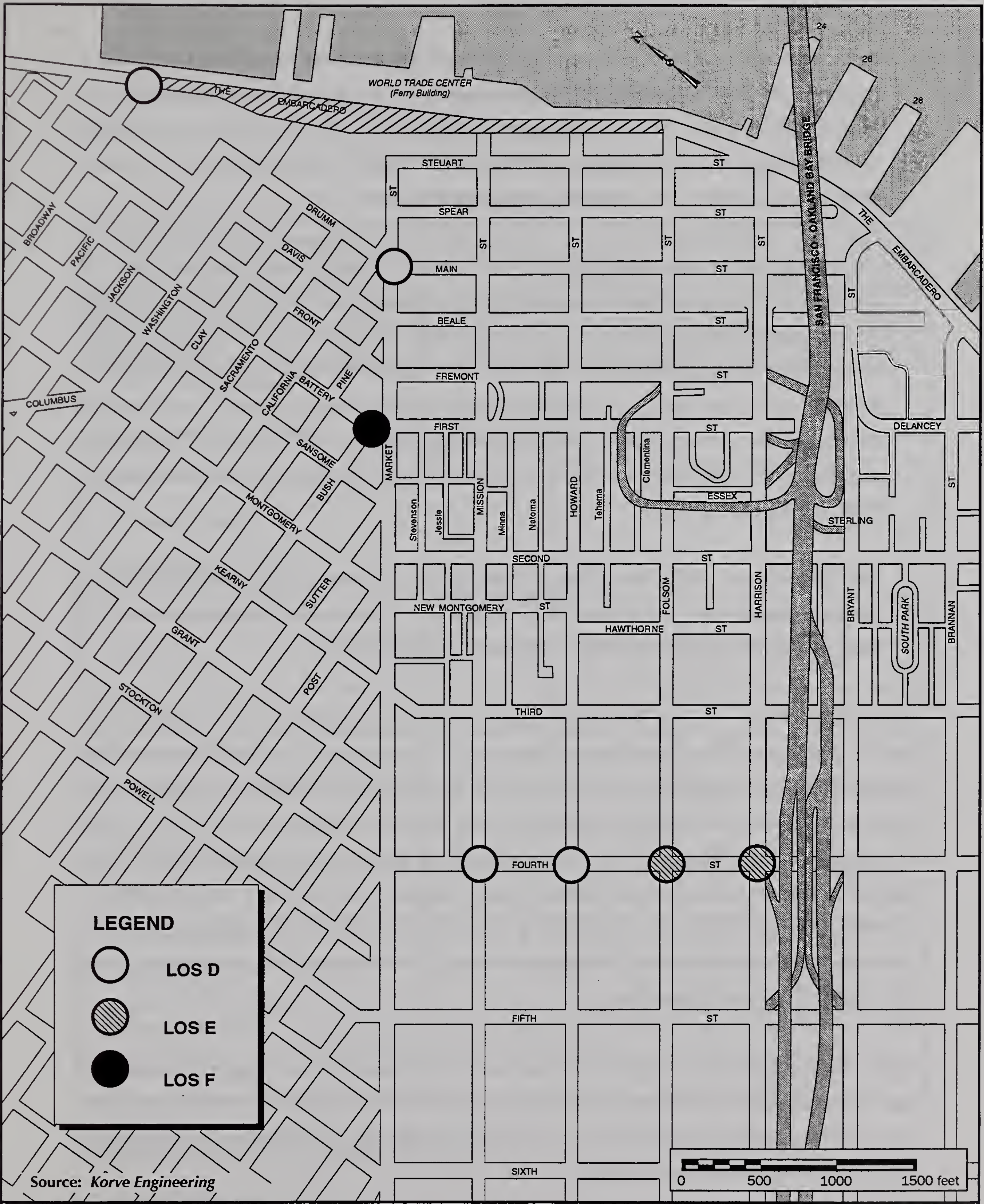
92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS
ALTERNATIVES 3B and 5B

Year 2015
PM Peak Hour

Figure 4.5-9



Source: *Korve Engineering*

92.202E & 94.060E

Alternatives to Replacement of The Embarcadero Freeway & Terminal Separator Structure

LEVEL OF SERVICE CONDITIONS ALTERNATIVE 4

Year 2015
PM Peak Hour

Figure 4.5-10

- The intersection of the Embarcadero roadway and Bryant Street would result in a LOS F under the No Build Alternative due to long queues on the Bryant Street approach and a short stacking area. All build alternatives would incorporate an additional mixed-flow eastbound lane on Bryant Street between Main Street and The Embarcadero, for a total of three lanes (two mixed-flow lanes and one transit lane), and would result in a LOS B or C.

- The LOS at the intersection of Fourth and Harrison Streets would degrade under all alternatives in the future over pre-earthquake and existing conditions (both at a LOS D). Under Alternatives Three and Five the degradation to LOS F is due to the proposed changes to the Fourth Street southbound on-ramp configurations, which would become a lane-merge into the I-80/U.S. 101 freeway, instead of the existing lane-add, and therefore decreasing the on-ramp capacity by approximately 33%. Under the No Build Alternative, and Alternatives Two and Four, the degradation to LOS E is due to an overall increase in traffic volumes in the area.

- The intersection of Fourth and Folsom Streets would be affected under all alternatives by spillback queues from Fourth Street and Harrison Street, and would degrade from a LOS C under pre-earthquake and existing conditions to a future LOS E or F.

Table 4.5-3 presents the LOS for the secondary study area intersections during the AM peak and PM peak hours. Most of the intersections within the secondary study area would maintain their existing or pre-earthquake LOS, with slightly longer delays. Localized congestion would occur at those locations providing access to and from the freeways, such as Bay Street, Broadway, and Third Street. Under all future alternatives, all the analyzed secondary study area intersections would maintain an acceptable level of service in the year 2015 (level of service D or better). Any substantial changes in LOS at intersections south of Townsend Street would be caused by planned changes to I-280 ramps or by future development in the vicinity, and would be unrelated to project alternatives.

During the AM peak hour, LOS at the intersection of Bay Street and the Embarcadero roadway would degrade under all alternatives, including the No Build Alternative, from LOS B to LOS D. The LOS degradation is primarily due to an increase in traffic on eastbound Bay Street making a right turn to southbound Embarcadero.

Table 4.5-3
LEVEL OF SERVICE
SECONDARY STUDY AREA
AM AND PM PEAK HOURS

INTERSECTION NAME	PRE-QUAKE		1993 EXISTING		2015 ALT. 1, 2 &4		2015 ALT. 3 & 5	
	AM	PM	AM	PM	AM	PM	AM	PM
1. Bay & The Embarcadero	B	B	B	C	D	D	D	D
2. Sansome & The Embarcadero	B	B	B	C	D	D	D	D
3. Battery/Lombard & The Embarcadero	E*	F*	E*	F*	B	C	B	C
4. Broadway & Stockton	B	B	C	B	D	B	D	B
5. Washington & Montgomery	B	C	B	B	B	B	B	B
6. California & Kearny	B	B	B	B	C	B	C	B
7. Post & Stockton	B	B	B	B	B	B	B	B
8. Townsend & Fourth	B	B	B	B	B	B	B	B
9. Townsend & Third	C	C	B	B	C	D	C	D
10. Pine & Mason	B	B	B	B	B	B	B	B
11. Bush & Powell	B	B	B	B	B	C	B	C
12. Sutter & Grant	B	B	B	B	B	B	B	B
13. O'Farrell & Taylor	B	B	B	B	B	B	B	B
14. Ellis & C. Magnin	B	B	B	B	B	C	B	C
15. O'Farrell & Powell	B	B	B	B	B	B	B	B
16. O'Farrell & Stockton	B	B	C	C	C	C	D	C

Unsignalized intersection. Minor approach Level of Service.

Source: Korve Engineering, Inc.

The intersection of Sansome Street and The Embarcadero would degrade from existing LOS C conditions to LOS D under all alternatives, including the No Build Alternative, in the AM peak hour. The decline in level of service conditions would be due to a combination of the increased northbound through traffic on The Embarcadero and northbound left turn traffic on Sansome Street.

The intersection of Broadway and Stockton Street would degrade from existing LOS C conditions to LOS D under all alternatives, including the No Build Alternative in the AM peak hour. The decline in level of service conditions would be due to an increase in background traffic on eastbound Broadway.

The intersection of Third Street and Townsend Street would degrade slightly from existing LOS B conditions to LOS C under all alternatives, including the No Build Alternative. The decline in LOS conditions is caused by an increase in northbound traffic on Third Street due to the full reopening of the I-280 freeway.

During the PM peak hour, LOS at the intersection of Bay Street and the Embarcadero roadway would degrade under all alternatives, including the No Build Alternative, from LOS B to LOS D. The increase in northbound traffic on The Embarcadero making a left turn to westbound Bay Street would cause the intersection to degrade to LOS D.

The intersection of Sansome Street and The Embarcadero would degrade from existing LOS B condition to LOS D under all alternatives, including the No Build Alternative, in the PM peak hour. The decline in level of service conditons would be caused by the increased southbound traffic on The Embarcadero.

The intersection of Third Street and Townsend Street would degrade from existing LOS B conditions to LOS D under all alternatives, including the No Build Alternative. The decline in level of service would be due to an increase in traffic caused by the reopening of the I-280 freeway.

Primary Study Area Travel Speeds

Table 4.5-4 presents average AM and PM peak hour travel speeds under future conditions for key street segments in the primary study area. Generally, street travel speeds would be lower

TABLE 4.5-4

AVERAGE TRAVEL SPEEDS (mph)
AM AND PM PEAK HOURS

STREET SEGMENT	PRE-QUAKE		1993 EXISTING		2015 ALT 1		2015 ALT 2		2015 ALT 3A		2015 ALT 3B		2015 ALT 4		2015 ALT 5A		2015 ALT 5B	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Battery Street SB (Broadway - Market St)	9	8	8	9	8	9	7	9	7	9	7	9	7	8	7	8	7	9
Beale Street SB (Market St - Folsom St)	14	14	18	16	10	16	12	15	10	15	10	15	17	15	17	15	17	15
Broadway EB (Battery - The Embarcadero)	17	9	18	16	11	11	6	11	14	11	9	10	16	15	10	11	9	10
Broadway WB (The Embarcadero - Sansome St)	19	16	15	13	15	11	15	11	16	10	15	11	15	13	16	11	15	14
Bryant Street EB (Sixth St - Second St)	17	12	17	14	15	11	16	15	18	15	16	15	16	15	16	15	15	15
Bryant Street WB (The Embarcadero - Sterling St)	21	22	22	22	17	20	19	20	22	5	22	5	18	3	22	5	20	6
First Street SB (Market St - Harrison St)	17	8	17	12	15	11	15	12	14	13	15	11	15	12	16	14	15	11
Fifth Street NB (Brannan St - Market St)	15	14	11	12	6	11	6	11	6	12	7	12	6	12	6	12	7	12
Folsom Street EB (First St - The Embarcadero)	9	13	10	17	11	11	9	14	7	12	8	12	7	12	7	12	8	10
Folsom Street EB (Sixth St - Second St)	17	12	16	17	15	11	15	10	16	15	10	16	15	15	16	15	14	14
Fourth Street SB (Market St - Brannan St)	13	8	13	8	13	11	13	5	6	5	6	5	12	5	6	5	6	5
Fremont Street NB (Folsom St - Market St)	14	14	10	17	14	11	14	13	15	13	15	13	15	13	16	13	15	13
Harrison Street WB (The Embarcadero - Second St)	10	17	11	14	10	10	10	15	11	12	11	14	11	10	11	12	14	14
Harrison Street WB (Second St - Sixth St)	18	15	12	15	11	10	11	11	6	12	8	10	12	11	8	10	8	10
Howard Street WB (The Embarcadero - Second St)	14	13	11	12	10	12	10	12	14	11	10	11	10	12	10	11	10	11
Howard Street WB (Second St - Sixth St)	16	16	17	14	16	15	16	13	16	16	16	14	16	14	16	14	16	14
Main Street NB (Harrsion St - Market St)	7	14	13	15	15	18	15	10	16	13	15	12	17	14	16	13	15	12
Market Street EB (Second St - Main St)	11	3	11	12	10	10	11	10	10	9	11	8	11	10	10	9	11	8
Market Street WB (Main St - Second St)	6	5	11	8	11	8	11	8	11	8	11	8	11	8	10	9	11	8
Mission Street WB (The Embarcadero - Fremont St)	12	11	10	10	10	11	10	11	10	12	10	12	10	12	10	12	17	12
Sansome Street NB (Market St - Broadway)	6	5	17	12	12	13	17	12	10	12	12	13	12	13	10	12	7	12
Second Street SB (Market St - Brannan St)	16	16	18	16	18	16	12	15	17	14	18	16	17	15	17	14	18	16
Second Street NB (Brannan St - Market St)	14	2	16	6	16	5	11	8	10	15	15	15	15	13	16	15	16	16
Sixth Street SB (Market St - Brannan St)	16	11	15	13	12	13	13	12	13	12	13	12	13	12	13	12	7	12
The Embarcadero (Surface Roadway)NB (Harrsion St - Broadway)	15	22	20	20	18	5	15	15	16	12	17	10	15	12	16	12	17	10
The Embarcadero (Surface Roadway)SB (Broadway - Harrison St)	11	9	18	21	20	20	19	17	17	17	18	17	18	16	17	17	18	17
Third Street NB (Brannan St - Market St)	14	14	11	12	13	12	11	12	12	12	11	12	10	12	12	12	11	12

Source: Korve Engineering, Inc.

under all alternatives than under existing or pre-earthquake conditions for both AM and PM peak hour conditions. This is due to an overall increase in traffic volume and congestion on City streets in the study area.

During AM peak hour, under Alternatives Three and Five, there would be a decrease in speed on Harrison Street westbound between Second Street and Sixth Street and on Fourth Street southbound between Market Street and Brannan Street from 21 km/h (11 mph) to 10 km/h (6 mph). This is due to the restriping at the Fourth Street southbound on-ramp to I-80/U.S. 101 from a lane-add to a lane-merge (necessary to accommodate the new Second Street on-ramp), which decreases the Fourth Street on-ramp capacity by 33%.

The No Build Alternative and Alternatives Two and Four would show similar average speed in the AM peak hour, and would generally have lower speeds than under pre-earthquake or existing conditions. Folsom Street eastbound between First Street and The Embarcadero would show the highest differences. Under Alternative Four, and also under Alternatives Three and Five, the change in signal cycle, from a two-phase to a three phase, at the Folsom Street and Fremont Street intersection would decrease average AM peak hour speed from about 16 km/h (10 mph) to 11 km/h (7 mph).

Under the Second Street Option of Alternatives Three and Five there would be a decrease in AM peak hour speed on Second Street northbound between Brannan Street and Market Street from 26 km/h (16 mph) to 16 km/h (10 mph) due to additional traffic coming from the new I-80 eastbound Second Street off-ramp between Bryant Street and Harrison Street. A smaller speed decrease is projected in the southbound direction.

In the PM peak hour, there would be a slight decrease in travel speed on First Street (from 27 km/h (17 mph) to 22 km/h (14 mph)) under Alternatives Three and Five due to an increase in congestion on Harrison Street caused by the new Harrison/Second Street on-ramp.

The Embarcadero roadway would have similar PM peak hour travel speeds among all alternatives; generally lower than under existing or pre-earthquake conditions. The only exception would be in the northbound direction under the No Build Alternative which would show a speed of 8 km/h (5 mph), less than half of that of the other alternatives (16 km/h (10 mph) to 24 km/h (15 mph)).

The Embarcadero roadway would have similar PM peak hour travel speeds among all alternatives; generally lower than under existing or pre-earthquake conditions. The only exception would be in the northbound direction under the No Build Alternative which would show a speed of 8 km/h (5 mph), less than half of that of the other alternatives (16 km/h (10 mph) to 24 km/h (15 mph)).

Primary Study Area Vehicle Queues

Table 4.5-5 presents average AM and PM peak hour vehicle queues under future conditions for key street segments in the primary study area. In general, longer queues are projected at key locations due to overall increases in year 2015 traffic volumes and due to street network changes proposed under the various alternatives.

On the Embarcadero roadway northbound, between Howard Street and Broadway, AM peak hour vehicle queues would be longer under all the alternatives, including the No Build Alternative, when compared to pre-earthquake and existing conditions. The increase in queue would be the highest under the No Build Alternative. AM peak hour vehicle queues for Alternatives Two, Three, Four, and Five would be similar to each other, but slightly lower than those under the No Build Alternative.

On the Embarcadero roadway southbound, AM peak hour vehicle queues would become longer at Broadway and at Washington Street under all alternatives, including the No Build Alternative, due to an increase in traffic volumes.

On First Street and Harrison Street, AM peak hour vehicle queues would increase under all alternatives when compared to existing conditions. Queues would be the highest under the No Build Alternative; queues for the build alternatives would be similar to each other, but lower than those under the No Build Alternative.

Similar to the AM peak hour conditions, PM peak hour vehicle queues would be longer on The Embarcadero northbound between Howard Street and Broadway under all alternatives, when compared to pre-earthquake and existing conditions. The increase in queue would be higher under Alternatives Three, Four, and Five than for the No Build Alternative and Alternative Two.

TABLE 4.5-5
MAXIMUM QUEUE PER LANE (vehicles) AT SELECTED LOCATIONS
AM AND PM PEAK HOURS

LOCATION	PRE-QUAKE		1993 EXISTING		2015 ALT. 1		2015 ALT. 2		2015 ALT. 3A		2015 ALT.3B		2015 ALT. 4		2015 ALT. 5A		2015 ALT.5B	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
The Embarcadero northbound at:																		
Bryant Street	12	17	8	8	13	10	13	10	17	8	17	8	13	7	17	8	17	8
Howard Street	6	6	8	9	15	9	12	9	10	14	9	13	12	12	10	14	9	13
Mission Street	10	6	6	6	16	12	17	16	13	13	10	10	17	17	13	13	10	10
Market Street	11	8	11	5	4	4	3	3	3	6	4	4	3	4	3	6	4	4
Washington Street	5	6	4	11	17	20	17	22	11	28	11	33	16	24	11	28	11	33
Broadway	3	4	17	27	20	26	17	22	14	31	13	38	17	31	14	31	13	38
The Embarcadero southbound at:																		
Broadway	3	3	13	11	15	17	15	17	14	16	14	16	14	15	14	16	14	16
Washington Street	5	3	6	6	15	13	13	14	15	15	19	14	16	14	15	15	19	14
Market Street	7	7	14	10	4	8	4	7	4	9	5	7	4	7	4	9	5	7
Mission Street	5	4	12	10	5	8	5	7	6	7	4	9	7	5	6	7	4	9
Howard Street	6	7	3	3	2	3	2	2	1	2	2	1	1	4	1	2	2	1
Bryant Street	7	27	4	26	15	13	16	12	15	16	15	18	16	16	15	16	15	18
First Street southbound at:																		
Mission Street	5	7	8	9	20	14	13	12	15	14	13	16	14	13	15	14	13	16
Howard Street	5	7	10	13	10	13	13	15	13	11	11	16	12	14	13	11	11	16
Folsom Street	7	14	5	10	6	11	7	11	6	16	4	13	5	10	6	16	4	13
Harrison Street	3	20	3	12	3	13	3	14	2	12	2	18	2	13	2	12	2	18
Harrison Street westbound at:																		
Spear Street	4	2	5	4	13	7	11	7	10	6	9	6	9	7	10	6	9	6
Main Street	4	4	9	10	7	9	11	8	7	10	5	8	6	8	7	10	5	8
Fremont Street	6	6	10	6	10	4	9	4	9	5	7	5	8	5	9	5	7	5
First Street	8	10	9	8	7	8	7	7	6	12	6	11	8	7	6	12	6	11
Fourth Street southbound at:																		
Mission Street	8	9	10	10	11	12	10	26	11	27	11	26	10	27	11	27	11	26
Howard Street	6	11	4	6	5	13	4	28	13	21	8	28	5	29	13	21	8	28
Folsom Street	6	28	10	16	10	33	11	29	24	28	25	28	11	27	24	28	25	28
Harrison Street	6	28	6	27	7	28	6	28	29	29	29	28	8	29	29	29	29	28
Third Street northbound at:																		
Harrison Street	8	12	15	11	17	12	17	13	17	25	20	25	22	16	17	25	20	25
Folsom Street	11	10	7	7	15	11	13	9	9	9	12	9	12	11	9	9	12	9
Howard Street	11	8	15	10	19	11	21	12	19	10	20	11	19	10	19	10	20	11
Mission Street	6	7	7	11	23	12	7	13	7	12	8	11	12	13	7	12	8	11
Market Street	14	10	26	17	30	21	19	12	14	10	15	14	16	12	14	10	15	14
Bryant Street westbound at:																		
Main Street	3	3	5	2	2	4	7	4	6	7	6	7	7	7	6	7	6	7
Beale Street	4	3	4	2	2	4	2	3	2	8	2	6	3	16	2	8	2	6
Sterling Street	0	0	0	0	0	0	0	0	0	63	0	60	0	64	0	63	0	60

Source: Korve Engineering, Inc.

PM peak hour queues would be longer on The Embarcadero southbound at Broadway and at Washington Street under all alternatives, due to an increase in traffic volumes.

On First Street, PM peak hour vehicle queues under the No Build Alternative, Alternative Two and Alternative Four, would be comparable to existing conditions. Alternatives Three and Five would operate with slightly longer queues than the other alternatives due to the new Harrison/Second Street on-ramp.

On Harrison Street westbound, all alternatives would operate similarly to the existing condition, except Alternatives Three and Five, which would have longer queues at First Street and at Fourth Street during the PM peak hour due to backup from the freeway on-ramps.

Queues on Fourth Street would be longer in the future than under existing conditions under all alternatives, including the No Build Alternative.

All alternatives would impact Third Street in a similar manner, with longer than existing queues during PM peak hour.

Vehicle queue on Bryant Street in the westbound direction at Sterling Street would increase under Alternatives Three, Four, and Five when compared to the No Build Alternative and Alternative Two. The total queue would be between 74 and 87 vehicles, reaching back to Main Street.

Under the Second Street Option of Alternatives Three and five, approximately 850 vehicles during the AM peak hour and 300 vehicles during the PM peak would exit the I-80 eastbound freeway via the proposed Second Street off-ramp. About 85% of the vehicles would turn left (northbound) at Second Street during the AM peak hour while only about 40% would do so during the PM peak. (Southbound to eastbound left turns would be prohibited at Bryant Street during the AM peak period.)

Due to the proposed off-ramp, peak vehicular traffic on Second Street between Bryant Street and Harrison Street would increase by approximately 60% (520 vehicles) in the northbound direction in the morning, and by 40% (200 vehicles) in the southbound direction during the evening. Other traffic movements in the vicinity of the ramp would remain similar to the existing values.

AM peak hour turns at the intersection of Second Street and Harrison Street would change when compared to the existing conditions because Harrison Street would be converted to a one-way westbound street between First Street and Third Street. Right turns from Second Street northbound would be eliminated. Left northbound turns would only increase slightly by 20 vehicles (from 100 to 120).

Southbound traffic traveling on Second Street would not be able to turn left or right at Bryant Street. Southbound left turns from Second Street at Bryant Street would be prohibited during the AM peak hour, and there would be no right turns either since Bryant Street is a one-way eastbound street.

Maximum average queues at the Second Street off-ramp would be about three vehicles per lane (approximately 60 feet) during the peak hours. Since the vehicles exiting the freeway at the beginning of the off-ramp would be almost at grade with Second Street, the 800-foot long ramp would provide sufficient sight distance to bring those vehicles to a safe stop at the end of the ramp, including the 60 feet of vehicles queued at the end of the ramp. (The minimum values for stopping sight distance considering a design speed of 50 mph is 430 feet.)

Street Network and Freeway System Balance

Based on the results of the demand-to-capacity analysis, shown in Table 4.5-6, all alternatives would provide sufficient on-ramp capacity to accommodate the estimated demand during the AM and PM peak hours. The on-ramp demand-to-capacity ratio for all alternatives would be lower (better) than pre-earthquake, but slightly worse than existing. The results for off-ramp capacity differ from AM to PM peak hour conditions.

In the AM peak hour, the off-ramp demand-to-capacity ratio for all alternatives would be higher (worse) than pre-earthquake. Under the No Build Alternative, Alternative Two and Alternative Four, which essentially maintain the existing ramp connections, future AM peak hour demand cannot be accommodated by the available off-ramp capacity. This means a queue spillback into the mainline freeway would occur. The Second Street Option of Alternatives Three and Five would show a similar value to the existing conditions, while the Fourth Street Option of Alternatives Three and Five would show a slight improvement (from 0.90 to 0.88) over the existing conditions.

Table 4.5-6

PRIMARY STUDY AREA FREEWAY RAMPS

DEMAND AND CAPACITY INFORMATION

AM AND PM PEAK HOURS

FACILITY	PRE-QUAKE		1993 EXISTING		2015 ALT 1		2015 ALT 2		2015 ALT 3A		2015 ALT 3B		2015 ALT 4		2015 ALT 5A		2015 ALT 5B	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
ON-RAMPS* TOTAL:																		
Demand (veh./hour)	7,070	8,850	4,180	5,780	4,500	6,020	4,500	6,020	4,850	6,240	4,850	6,240	4,630	5,440	4,850	6,240	4,850	6,240
Capacity (veh./hour)	8,600	7,600	7,700	6,700	7,700	6,700	7,700	6,700	8,600	6,900	8,600	6,900	7,700	6,000	8,600	6,900	8,600	6,900
Demand-to-Capacity ratio	0.82	1.16	0.54	0.86	0.58	0.90	0.58	0.90	0.56	0.90	0.56	0.90	0.60	0.91	0.56	0.90	0.56	0.90
OFF-RAMPS TOTAL:																		
Demand (veh./hour)	9,920	5,420	7,170	5,010	8,180	5,460	8,180	5,460	8,390	5,680	8,390	5,680	8,080	5,460	8,390	5,680	8,390	5,680
Capacity (veh./hour)	11,800	11,800	8,000	8,000	8,000	8,000	8,000	8,000	9,100	9,100	9,500	9,500	8,000	8,000	9,100	9,100	9,500	9,500
Demand-to-Capacity ratio	0.84	0.46	0.90	0.63	1.02	0.68	1.02	0.68	0.92	0.62	0.88	0.60	1.01	0.68	0.92	0.62	0.88	0.60

* *Non-HOV on-ramp values only. The PM peak hour HOV-only on-ramps (Sterling Street or Essex Street, depending on the alternative) have not been included in this comparison summary because they have substantially better demand-to-capacity ratio than the rest of the on-ramps, and their inclusion could therefore distort the interpretation of the results, i.e., show a total demand-to-capacity ratio lower than 1, although the total demand-to-capacity ratio for the mixed flow on-ramps only be above 1.*

Source: Korve Engineering, Inc.

Future PM peak hour demand for off-ramp capacity would be accommodated under all alternatives, including the No Build Alternative. All future demand-to-capacity values are higher (worse) than pre-earthquake, but close to existing. The No Build Alternative, Alternative Two and Alternative Four, which essentially maintain the existing ramp connections, show worse results than existing conditions (0.68). The Second Street Option of Alternatives Three and Five, which incorporate a new off-ramp at Second Street show slightly better value than in the existing conditions, while the Fourth Street Option of Alternatives Three and Five, which would widen the current Fourth Street off-ramp, show a 5% improvement (from 0.63 to 0.60) over the existing conditions.

Incident Analysis

As indicated previously in this report, levels of service shown in the downtown area roadway network reflect normal conditions. Given the high volume-to-capacity ratios estimated at the downtown on-ramps, those intersections in the vicinity of the ramps would quickly deteriorate to less than acceptable conditions (LOS E or F) in the case of an accident or stall on the Bay Bridge, or in the case of slightly greater traffic volumes (on the freeway or on local streets) than those projected to occur under normal conditions. The City's Department of Parking and Traffic estimates that "incident" conditions occur in the PM peak period about 25% to 30% of weekday evenings. This section presents a summary of the results of the analysis performed to determine future traffic operations on City streets when a freeway incident occurs.[14]

Prior to the Loma Prieta Earthquake, the TSS and the Embarcadero Freeway provided above grade storage capacity when congestion on I-80/U.S. 101 restricted access to the mainline. The on-ramps for the Embarcadero Freeway and the TSS regularly functioned as elevated traffic queues because the multiple on-ramps delivered traffic at greater rates than could be absorbed by the mainline freeway system.

With the removal of the elevated structures, vehicles are currently stored on the surface streets. As an example, the San Francisco Department of Parking and Traffic (DPT) estimates that on average, seven weekdays a month, maximum PM peak hour vehicle queues on First Street sources, during five of those seven weekdays (25% of the time) maximum queues reach Market Street and extend beyond, on Battery Street. The ability of the local street network to cope with high levels of traffic congestion due to saturation on the mainline freeway, under each proposed alternative, is an important indicator of their overall performance.

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[14] A more detailed analysis is presented in a separate technical paper: Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure, Incident Analysis, Korve Engineering Inc., December 30, 1994. A copy of this paper is available for review at the San Francisco Planning Department, 1660 Mission Street.

The specific incident condition analyzed in this study assumes heavy congestion on the I-80 freeway in the eastbound direction, thus restricting the flow rates at First Street, Essex Street, Sterling Street and Fifth Street on-ramps by 50 percent. Mainline freeway incidents in the westbound direction were not analyzed as part of this study, although westbound incidents may contribute to the queuing on local streets observed by the Department of Parking and Traffic.

It was assumed in the incident analysis that, during congested conditions, all intersections would remain completely clear of queued vehicles. This reflects the situations that occur when parking control officers (PCOs) are assigned to keep the intersection clear and ensure that cross-street traffic has the ability to pass through. For example, when First Street is backed-up due to congestion on the Bridge, traffic agents would ensure that Mission Street traffic could proceed through the intersection.

For the incident analysis, the five alternatives to replacement of the Embarcadero Freeway and the TSS are grouped into three general scenarios based on their ramp connections and traffic operations in the future year 2015.

Scenario 1 represents the No-Build Alternative (Alternative One). This alternative was analyzed separately so that it can be compared with the other alternatives. Scenario 2 represents Alternative Two, which is similar to the No Build Alternative, but includes some improvements in the street network. Scenario 3 includes Alternatives Three, Four and Five, all of which would shift HOV eastbound access to the Essex Street on-ramp and mixed-flow traffic operations to the Sterling Street on-ramp. Although there are roadway design differences among Alternatives Three, Four and Five, they were groupd together because the incident analysis affects vehicles headed towards the East Bay (eastbound direction) and eastbound on-ramp operations (HOV versus mixed-flow) at Sterling and Essex Streets would be very similar among the three alternatives.

The results of the incident analysis include levels of service (LOS) and queue lengths at selected intersections and roadway segments. The incident analysis is focused on year 2015

PM peak hour conditions on the primary arteries providing major access to the freeway on-ramps.

Level of Service

Table 4.5-7 presents the PM peak hour LOS at key intersections in the primary study area under incident conditions. The intersections on the streets leading to East Bay-bound ramps would degrade in LOS, reaching LOS F at several locations. The table indicates that the No Build and the Alternative Two scenarios would operate in a similar manner except for minor differences in the LOS and queue lengths, which would be slightly better under the Alternative Two scenario.

Under the No Build and the Alternative Two scenarios, major congestion would occur on First, Essex, Second, Third, Harrison, Folsom, Howard and Battery Streets. The Sterling Street on-ramp would operate at LOS F, but the backup would not affect traffic at nearby intersections on Bryant and Second Streets because they would serve HOV vehicles only during the PM peak. The Essex Street on-ramp would operate at LOS F, while the intersections in its vicinity on Second, Third and Harrison Streets would be heavily congested, operating at LOS E or F.

Table 4.5-7 also indicates that the New Ramp Connections (Alternatives Three, Four, and Five) scenario would operate very differently from the other two scenarios. This is caused by changes in traffic patterns due to the switch in HOV and mixed-traffic flow operations at the Essex Street and the Sterling Street on-ramps. Under the New Ramp Connection scenario, major congestion would occur on First, Bryant, Second, Third, Fifth, Harrison, Folsom, Howard and Battery Streets. The Sterling Street on-ramp would operate at LOS F and the congestion spillback would affect those intersections on Bryant and Second Streets. The Essex Street on-ramp would operate at LOS E, but the backup would not affect the nearby intersections since the on-ramp would only serve HOV vehicles. Under the New Ramp Connections scenario, the Fifth Street/Bryant Street on-ramp would also operate at LOS F because traffic would be diverted to this ramp from the conversion of the Essex Street on-ramp to HOV-only operation.

When comparing non-incident with incident conditions, the No Build scenario would have the highest number of intersections (27) that would change from an acceptable LOS (D or better) to LOS E or F. Under the Alternative Two scenario, 20 intersections would change from an acceptable LOS under normal conditions to an unacceptable LOS under incident conditions.

TABLE 4.5-7
SIGNALIZED INTERSECTION LOS SUMMARY
YEAR 2015 INCIDENT CONDITIONS
PM PEAK HOUR

INTERSECTION	2015 Scenario 1	2015 Scenario 2	2015 Scenario 3
Harrison & First	F	F	F
Harrison & Fremont	F	F	F
Harrison & Main	E	E	F
Harrison & Spear	F	F	F
Harrison & Essex	F	F	E
Folsom & First	F	F	F
Folsom & Fremont	E	C	D
Folsom & Beale	A	B	B
Folsom & Main	D	A	A
Folsom & Spear	D	D	E
Folsom & Steuart	E	D	D
Howard & First	F	F	F
Howard & Fremont	F	E	F
Howard & Beale	E	D	F
Howard & Main	F	D	F
Howard & Spear	F	B	C
Howard & Steuart	E	C	B
Mission & First	F	F	F
Mission & Fremont	B	B	B
Mission & Beale	B	B	C
Mission & Main	B	B	B
Mission & Spear	B	A	B
Mission & Steuart	B	B	B
Market & Sansome	D	D	D
Market & Battery	E	C	C
Market & Fremont	B	B	B
Market & Beale	B	B	B
Market & Main	D	D	C
Sansome & Bush	F	F	F
Sansome & Pine	B	B	B
Sansome & California	C	B	C
Sansome & Sacramento	B	B	B
Sansome & Clay	C	B	C
Sansome & Washington	B	A	B
Sansome & Jackson	A	B	B

Scenario 1: No Build Alternative
Scenario 2: Alternative 2
Scenario 3: Alternatives Three, Four, and Five

Source: Korve Engineering, Inc.

TABLE 4.5-7 (Continued)
SIGNALIZED INTERSECTION LOS SUMMARY
YEAR 2015 INCIDENT CONDITIONS
PM PEAK HOUR

INTERSECTION	2015 Scenario 1	2015 Scenario 2	2015 Scenario 3
Sansome & Pacific	A	A	A
Sansome & Broadway	A	A	A
Battery & Bush	F	F	F
Battery & Pine	E	E	E
Battery & California	E	E	E
Battery & Sacramento	E	E	E
Battery & Clay	D	D	E
Battery & Washington	D	C	D
Battery & Jackson	C	B	C
Battery & Pacific	B	A	B
Battery & Broadway	B	B	B
Front & Pine	B	A	A
Front & California	B	B	A
Front & Sacramento	C	D	D
Front & Clay	B	B	B
Front & Broadway	B	B	B
Davis & California	B	B	A
Davis & Sacramento	B	B	C
Davis & Broadway	B	B	B
Drumm & California	B	B	B
Drumm & Sacramento	B	B	B
Drumm & Clay	B	B	B
Drumm & Washington	B	B	B
The Embarcadero & Bryant	B	B	C
The Embarcadero & Brannan	B	C	B
The Embarcadero & Harrison	D	C	D
The Embarcadero & Folsom	D	C	C
The Embarcadero & Howard	D	A	B
The Embarcadero & Mission	D	A	A
The Embarcadero & Washington	D	B	B
The Embarcadero & Broadway	F	C	D
Bryant & Beale	B	B	F
Bryant & Main	B	B	F
Second & Brannan	F	F	F
Second & Bryant	F	F	F

Scenario 1: No Build Alternative
Scenario 2: Alternative 2
Scenario 3: Alternatives Three, Four, and Five

Source: Korve Engineering, Inc.

TABLE 4.5-7 (Continued)
SIGNALIZED INTERSECTION LOS SUMMARY
YEAR 2015 INCIDENT CONDITIONS
PM PEAK HOUR

INTERSECTION	2015 Scenario 1	2015 Scenario 2	2015 Scenario 3
Second & Harrison	F	F	B
Second & Folsom	E	E	B
Second & Howard	B	C	B
Second & Mission	C	D	F
Second & Market	E	F	F
Third & Brannan	C	D	D
Third & Bryant	F	F	D
Third & Harrison	E	E	C
Third & Folsom	C	B	B
Third & Howard	B	B	B
Third & Mission	C	B	B
Third & Market	B	B	C
Fourth & Brannan	B	B	D
Fourth & Bryant	C	C	C
Fourth & Harrison	F	F	F
Fourth & Folsom	E	E	E
Fourth & Howard	B	B	D
Fourth & Mission	B	B	C
Fourth & Market	B	B	C
Fifth & Brannan	B	B	F
Fifth & Bryant	C	C	F
Fifth & Harrison	C	C	C
Fifth & Folsom	B	B	B
Fifth & Howard	C	C	C
Fifth & Mission	A	A	A
Fifth & Market	C	C	C
Sixth & Brannan	B	B	C
Sixth & Bryant	B	B	B
Sixth & Harrison	B	B	B
Sixth & Folsom	B	B	B
Sixth & Howard	B	B	B
Sixth & Mission	B	B	B
Sixth & Market	B	B	B

Scenario 1: No Build Alternative
Scenario 2: Alternative 2
Scenario 3: Alternatives Three, Four, and Five

Source: Korve Engineering, Inc.

Under the New Ramp Connections scenario, 25 intersections that would operate under normal conditions at LOS D or better, would experience LOS E or F if an incident occurred.

Vehicle Queues

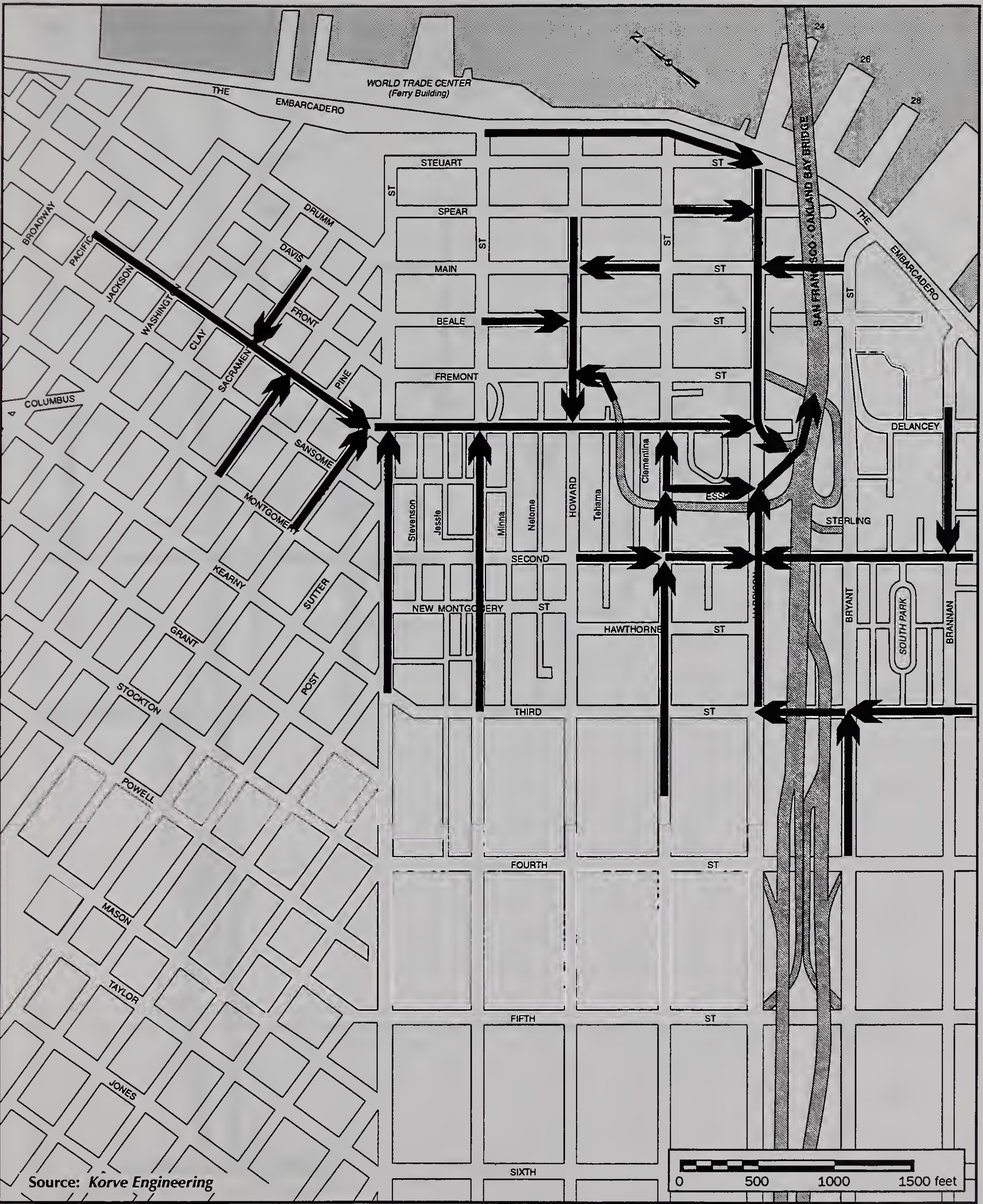
Figures 4.5-11 through 4.5-13 depict the maximum queues caused by an incident on I-80 eastbound during the PM peak hour in the local street network of the downtown area, for each 2015 scenario. Substantial queuing would occur under all three scenarios, especially on those streets providing access to the I-80 freeway. The differences among the scenarios are noted below.

The No Build and the Alternative Two scenarios show long queues of vehicles on those streets which provide access to the I-80 on-ramps, such as Harrison, Essex, Folsom, Howard, First and Second Streets. Under incident conditions, maximum queues would spillback to Battery, The Embarcadero, Steuart, Spear, Main and Beale Streets. Vehicle saturation on those streets would create backups on other cross-streets in the downtown area, such as Bush, Market, Mission and Fremont Streets.

The New Ramp Connections scenario would cause similar queues to those shown for the other two scenarios. Major differences would include: longer queues on Battery Street due to higher levels of congestion in the First Street/Harrison Street area; no queues on Essex Street, which would become a HOV-only on-ramp; longer queues on Bryant Street to access the mixed-flow on-ramp; and longer queues on Fifth Street and Bryant Street approaching the Fifth/Bryant on-ramp.

Weekend Traffic

Traffic counts conducted in 1993 found that traffic volumes at key intersections within the primary study area were somewhat less during the weekend peak (Saturday midday) period than during weekday periods. Congestion levels were similar at all intersections, which operated at LOS B. For example, the intersection of Broadway with The Embarcadero, which currrently operates at LOS B under normal weekday PM peak hour conditions, was found to operate at LOS B on the weekends at midday.



Source: *Korve Engineering*

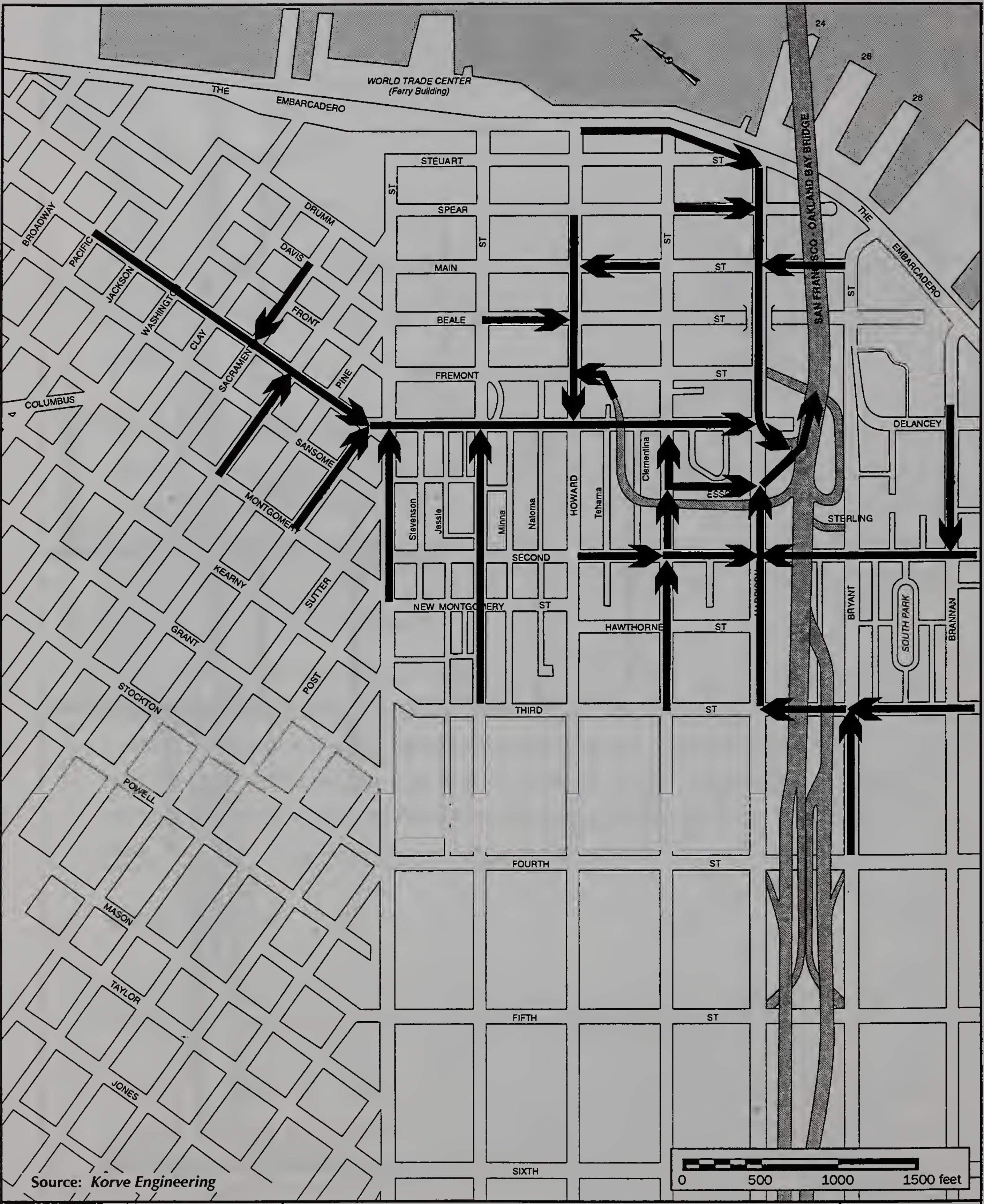
92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

INCIDENT QUEUES, SCENARIO 1
NO BUILD ALTERNATIVE 1

Eastbound Incident Conditions
Year 2015 - PM Peak Hour

Figure 4.5-11



Source: *Korve Engineering*

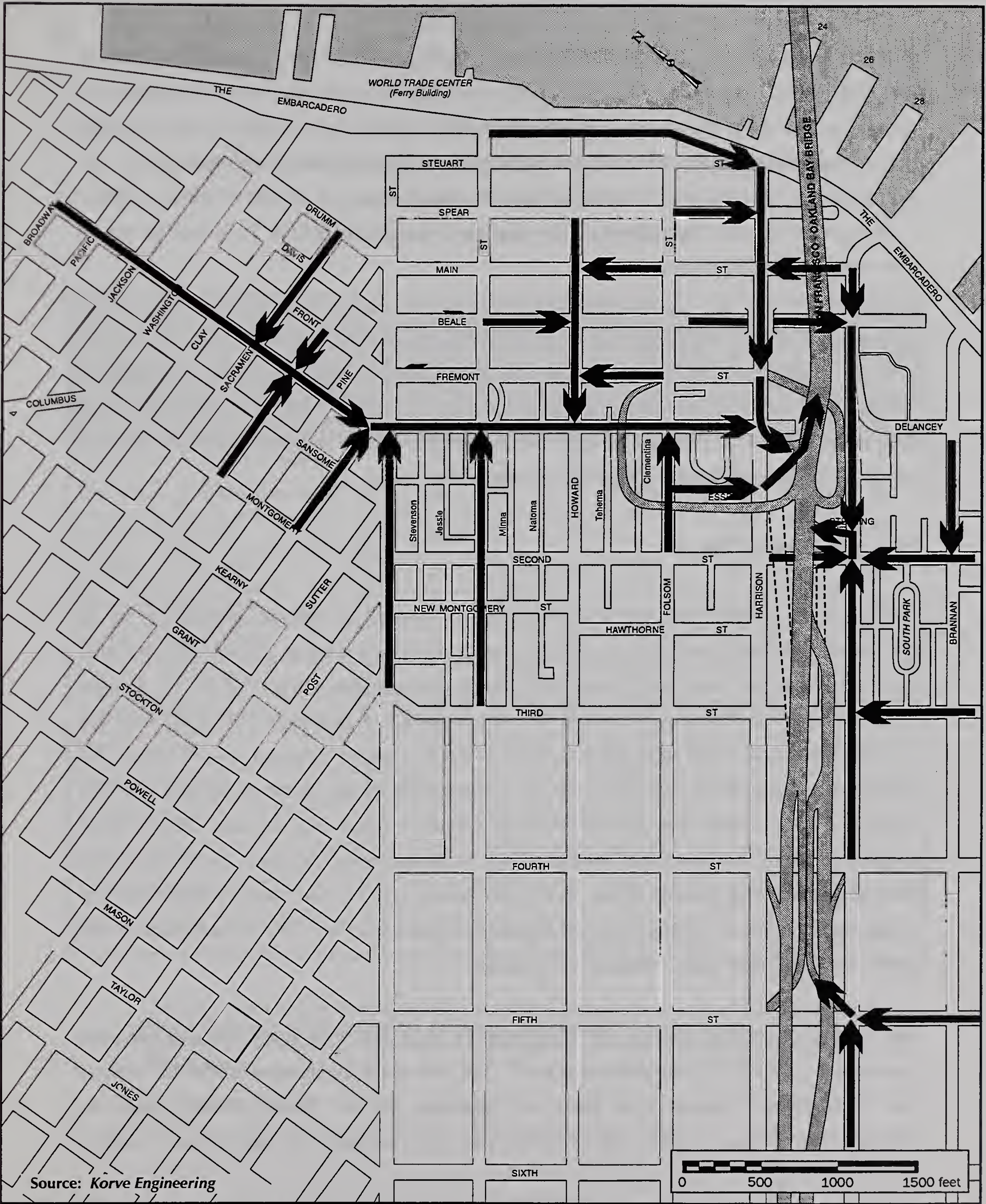
92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

INCIDENT QUEUES, SCENARIO 2
ALTERNATIVE 2

Eastbound Incident Conditions
Year 2015 - PM Peak Hour

Figure 4.5-12



Source: *Korve Engineering*

92.202E & 94.060E

Alternatives to Replacement of
The Embarcadero Freeway &
Terminal Separator Structure

INCIDENT QUEUES, SCENARIO 3 ALTERNATIVES 3, 4 & 5

Eastbound Incident Conditions
Year 2015 - PM Peak Hour

Figure 4.5-13

Table 4.5-8 presents the LOS for selected primary study area intersections during the weekend (Saturday) midday peak hour. As shown, under the existing condition all selected intersections operate at LOS B. Under all future alternatives, neither anticipated increases in traffic volumes due to cumulative growth forecast, nor network changes proposed in the alternatives, are expected to change the level of service at any intersection analyzed, except for the intersection of Brannan Street with Sixth Street. (This change, from LOS B to LOS D, is due to the full reopening of the I-280 freeway.)

Intersections along The Embarcadero are expected to function at LOS B, even though the roadway would have two-thirds the capacity that it would during weekday peak periods (because the curb lane would be used for parking on weekends). The Fourth Street Option of Alternatives Three and Five was not quantitatively analyzed, but it is projected to function very similar to the Second Street Option of those alternatives.

Freeway Operations

This section presents the results of the freeway operations analysis conducted for all alternatives. The study area selected for the freeway operations analysis includes the section of the I-80 freeway from west end of the Bay Bridge to the west side of the I-80/U.S. 101 junction (Figure 4.5-14). The freeway study area is approximately four kilometers (2.5 miles) long and includes the mainline and associated ramps. In the westbound direction, the off-ramps that were analyzed are at Fremont Street, Harrison Street, Fifth Street, Eighth Street and U.S. 101 North; and the on-ramps are at Fourth Street and Seventh Street, plus the new Second Street on-ramp proposed in Alternatives Three and Five. In the eastbound direction, the off-ramps that were analyzed are at Seventh Street and Fourth Street, plus the new Second Street off-ramp proposed in the Second Street Option of Alternatives Three and Five. The on-ramps are at Fifth Street, Sterling Street, Essex Street and First Street.

The freeway operations analysis was conducted for both directions in the AM and PM peak periods using the FREQ11 software program.[15] The purpose of the freeway operations analysis was to determine whether high levels of congestion on the freeway would cause the streets/ramps/ freeway system to break down (i.e., reach saturation or gridlock) under any of

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[15] For more details on the freeway operations analysis methodology, please see the Transportation Background Report. A copy of this report is available for public review in the project case file at San Francisco Planning Department, 1660 Mission Street, San Francisco.

Table 4.5-8

INTERSECTION WEEKEND MIDDAY PEAK HOUR LOS SUMMARY

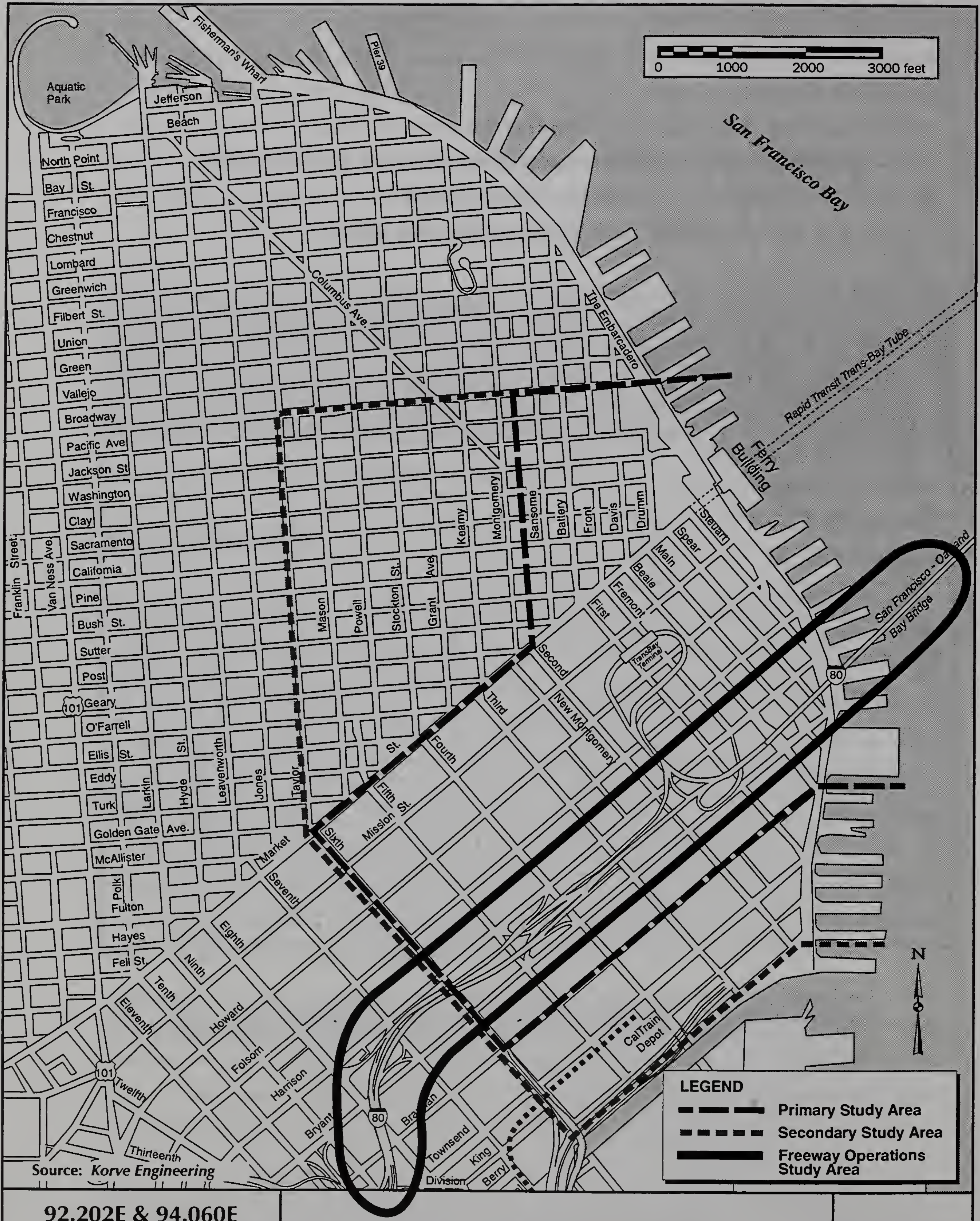
PRIMARY STUDY AREA

YEARS 1993 AND 2015 CONDITIONS[1]

INTERSECTION NAME	1993 EXISTING	2015 ALT. 1 (No Build) & ALT. 2	2015 ALT. 3 & 5 (2nd St. Option)	2015 ALT. 4
Broadway & The Embarcadero	B	B	B	B
Washington & The Embarcadero	B	B	B	B
California & Drumm	B	B	B	B
Washington & Drumm	B	B	B	B
Market & Main/Drumm	B	B	B	B
Market & Fremont/Front	B	B	B	B
Market & First/Battery	B	B	B	B
Market & Fourth/Stockton	B	B	B	B
Mission & Fifth	B	B	B	B
Howard & Fremont	B	B	B	B
Howard & Third	B	B	B	B
Harrison & First	B	B	B	B
Harrison & Fourth	B	B	B	B
Brannan & Sixth	B	D	D	D

1. *Data presented is from the Terminal Separator Structure/Mid-Embarcadero Preliminary Transportation Study Final Report, prepared by Korve Engineering, Inc. and Parsons Brinkerhoff Quade & Douglas, January 1994. A copy of this report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street.*

Source: Korve Engineering, Inc.



Source: *Korve Engineering*

92.202E & 94.060E

Alternatives to Replacement of The Embarcadero Freeway & Terminal Separator Structure

FREEWAY OPERATIONS STUDY AREAS

Figure 4.5-14

the five project future alternatives under study. Pre-earthquake freeway mainline traffic operations were not modeled; however, changes since the earthquake are discussed generally in Section 3.3.1, pp.122-126.

Table 4.5-9 presents the results of the freeway operations analysis under 1993/1994 existing conditions and shows that during the AM peak period or the PM peak period, a total of approximately 70,000 vehicles enter the freeway system in both directions. The average travel distance is about three kilometers (two miles) at an average speed close to 50 km/h (30 mph); hence, the average travel time is roughly four minutes. Total ramp delay is lowest (58 vehicle-hours) during the AM peak period in the eastbound direction and highest (346 vehicle-hours) during the AM peak period in the westbound direction.

For the purposes of the 2015 future analysis, the five project alternatives were grouped into four general scenarios based on their ramp connections, as follows:

Scenario A: Existing Ramp Connections: No Build (Alternative One), Alternatives Two and Four.

Scenario B: Second Street and Harrison Street new ramp connections: Second Street Option of Alternatives Three and Five.

Scenario C: Harrison Street new ramp connection only: Fourth Street Option of Alternatives Three and Five.

Alternative Four is classified under the Existing Ramp Connections scenario for freeway operations analysis purposes because it is similar to Alternative Two in terms of future freeway volumes, as well as freeway mainline and on- and off-ramp configuration, with the exception of the operation of Essex and Sterling Streets on-ramps during the PM peak period. (There would be no difference in Essex Street and Sterling Street operation in the AM peak period; however, the mixed-flow and High Occupancy Vehicle (HOV) operation in Alternative Four during the PM peak period would be reversed when compared to the No Build Alternative or Alternative Two). Alternative Two would experience the worst case freeway operation conditions under the Existing Ramp Connections scenario because Sterling Street would be operating at capacity under the No Build Alternative, Alternative Two or Alternative Four, while Essex Street would

Table 4.5-9
FREEWAY OPERATIONS ANALYSIS RESULTS
SUMMARY STATISTICS
1993/1994 EXISTING CONDITIONS
AM and PM Peak Periods

TIME PERIOD/ SCENARIO	TOTAL VEHICLES ENTERING SYSTEM	FREEWAY TRAVEL TIME (veh.-hours)	RAMP DELAY (veh.-hours)	TOTAL TRAVEL TIME (veh.-hours)	AVERAGE TRAVEL TIME (minutes)	TOTAL TRAVEL DISTANCE (veh.-miles)	AVERAGE TRAVEL DISTANCE (miles)	AVERAGE MAINLINE SPEED (mph)	FREEWAY SYSTEM SPEED * (mph)
AM EASTBOUND	28,700	1,635	58	1,693	4	58,904	2.05	36	35
PM EASTBOUND	31,100	1,701	119	1,820	4	48,673	1.57	29	27
AM WESTBOUND	41,600	2,530	346	2,876	4	88,656	2.13	35	31
PM WESTBOUND	40,100	2,325	122	2,447	4	75,007	1.87	32	31

* Freeway system speed includes the speeds on the mainline and the ramps

AM PEAK PERIOD: 6:30 to 9:15
PM PEAK PERIOD: 3:30 to 6:15

Source: Korve Engineering, Inc.

carry higher traffic volumes under Alternative Two than it would under the No Build Alternative or Alternative Four.

Future Freeway Volumes

The future (2015) freeway traffic volumes would increase in the westbound and eastbound directions during both the AM and PM peak periods when compared to the existing traffic volumes. Table 4.5-10 presents the projected volumes for the freeway mainline and the on- and off-ramps for all the future scenarios. The estimated total growth for both the Second Street Option and the Fourth Street Option of Alternatives Three and Five is higher than for the Existing Ramp Connections scenario (No Build Alternative, Alternative Two and Alternative Four) except for the freeway mainline volumes in the westbound direction during the AM peak. The differences in future freeway travel demand are explained by the differences in each scenario's roadway network configuration, which affects the downtown area's accessibility, and in turn influences mode of travel (auto vs. transit) and travel patterns. The changes in future traffic demand due to each alternative's roadway network configuration are discussed in more detail under "Future Travel Forecasts," pp. 240-241.

The westbound mainline would have approximately the same level of traffic during the AM peak in all scenarios because the total number of vehicles is controlled by the capacity of the Bay Bridge. On- and off-ramp demand would increase in the future under all scenarios when compared to the existing conditions.

TABLE 4.5-10
ESTIMATED FREEWAY DEMAND FUTURE YEAR 2015 AM AND PM PEAK PERIODS

TIME PERIOD/ SCENARIO	VEHICLES ENTERING MAINLINE	VEHICLES ENTERING RAMPS	TOTAL VEHICLES ENTERING SYSTEM
AM EASTBOUND			
1993/94 Existing	14,700	14,000	28,700
2015 Scenario A	17,600	14,300	31,900
2015 Scenario B	21,700	15,800	37,500
2015 Scenario C	21,700	15,800	37,500
AM WESTBOUND			
1993/94 Existing	26,900	14,700	41,600
2015 Scenario A	28,900	16,600	45,500
2015 Scenario B	28,900	17,600	46,500
2015 Scenario C	28,900	17,500	46,400
PM EASTBOUND			
1993/94 Existing	10,400	20,700	31,100
2015 Scenario A	11,800	22,100	33,900
2015 Scenario B	12,600	21,400	34,000
2015 Scenario C	12,600	21,300	33,900
PM WESTBOUND			
1993/94 Existing	22,000	18,100	40,100
2015 Scenario A	24,400	19,200	43,600
2015 Scenario B	25,800	21,800	47,600
2015 Scenario C	25,800	21,800	47,600

2015 SCENARIO A:	Alternatives 1, 2, and 4
2015 SCENARIO B:	Alternatives 3a and 5a
2015 SCENARIO C:	Alternatives 3b and 5b

AM PEAK PERIOD:	6:30 to 9:15
PM PEAK PERIOD:	3:30 to 6:15

Source: Korve Engineering, Inc.

I-80 Westbound Operation

Table 4.5-11 presents system-wide statistics for the AM and PM peak periods. Freeway speeds would decrease in all future alternatives during both the AM and PM peak periods when compared to the existing conditions.

During the AM peak period, total travel time would increase from the existing 2,900 vehicle-hours to 4,800 vehicle-hours under the Existing Ramp Connections scenario, an increase of 66 percent over the existing condition. Total travel time for both the Second Street Option and the Fourth Street Option of Alternatives Three and Five would be approximately 5,100 vehicle-hours, an increase of 76 percent over the existing condition. The vehicle-hours for the Second Street Option and the Fourth Street Option of Alternatives Three and Five would be higher when compared to the Existing Ramp Connections scenario in part because of the higher number of vehicles that would access the freeway system under alternatives Three and Five (an increase of two percent over the Existing Ramp Connections scenario).

System-wide average travel time per vehicle during the AM peak period would increase from four minutes under the existing condition to six minutes under all future scenarios. This indicates that the freeway would experience higher congestion levels in the future when compared to the existing conditions; and it would take 50% longer for a vehicle to travel the same distance, potentially extending the AM peak period in the future.

The average mainline speed presented in Table 4.5-11 represents the operating speed of an individual vehicle travelling on the mainline only. This average mainline speed is the overall speed of the freeway mainline from one end to the other end of the study area. The freeway system speed, on the other hand, represents the average speed of the freeway system which includes both the mainline and the ramps.

As shown in Table 4.5-11, freeway system speed would decrease from the existing 50 km/h (31 mph) to 30 km/h (19 mph) under the Existing Ramp Connections scenario, and would decrease even more under the Second Street Option of Alternatives Three and Five to 27 km/h (17 mph), and under the Fourth Street Option of Alternatives Three and Five to 29 km/h (18 mph).

TABLE 4.5-11
FREEWAY OPERATIONS ANALYSIS RESULTS SUMMARY STATISTICS, FUTURE CONDITIONS
AM and PM Peak Periods

TIME PERIOD / SCENARIO	TOTAL VEHICLES ENTERING SYSTEM	FREEWAY TRAVEL TIME (veh-hours)	RAMP DELAY (veh.-hours)	TOTAL TRAVEL TIME (veh.-hours)	AVERAGE TRAVEL TIME (minutes)	TOTAL TRAVEL DISTANCE (veh.-miles)	AVERAGE TRAVEL DISTANCE (miles)	AVERAGE MAINLINE SPEED (mph)	FREEWAY SYSTEM SPEED * (mph)
AM EASTBOUND									
1993/94 Existing	28.700	1,635	58	1,693	4	58,904	2.05	36	35
2015 Scenario A	31,900	2,902	203	3,105	6	56,129	1.76	19	18
2015 Scenario B	37,500	4,426	708	5,134	8	55,315	1.48	12	11
2015 Scenario C	37,500	4,447	708	5,155	8	54,813	1.46	12	11
PM EASTBOUND									
1993/94 Existing	31,100	1,701	119	1,820	4	48,673	1.57	29	27
2015 Scenario A	33,900	3,471	368	3,839	7	47,484	1.40	14	12
2015 Scenario B	34,000	3,526	792	4,318	8	47,593	1.40	13	11
2015 Scenario C	33,900	3,628	692	4,320	8	47,679	1.41	13	11
AM WESTBOUND									
1993/94 Existing	41,600	2,530	346	2,876	4	88,656	2.13	35	31
2015 Scenario A	45,500	3,646	1,199	4,845	6	90,753	1.99	25	19
2015 Scenario B	46,500	3,898	1,200	5,098	7	88,915	1.91	23	17
2015 Scenario C	46,400	3,874	1,199	5.073	7	89,090	1.92	23	18
PM WESTBOUND									
1993/94 Existing	40,100	2,325	122	2,447	4	75,007	1.87	32	31
2015 Scenario A	43,600	3,759	533	4,292	6	76,433	1.75	20	18
2015 Scenario B	47,600	5,350	1,130	6,480	8	70,548	1.48	13	11
2015 Scenario C	47,600	5,229	1,250	6,479	8	70,500	1.48	13	11

2015 Scenario A:	Alternatives 1, 2, and 4
2015 Scenario B:	Alternatives 3a and 5a
2015 Scenario C:	Alternatives 3b and 5b

AM PEAK PERIOD: 6:30 to 9:15
PM PEAK PERIOD: 3.30 to 6:15

* Freeway system speed includes the speeds on the mainline and the ramps

Source: Korve Engineering, Inc.

During the PM peak period, total travel time would increase from the existing 2,400 vehicle-hours to 4,300 vehicle-hours under the Existing Ramp Connections scenario, an increase of 79 percent over the existing condition. Total travel time for the Second Street Option and the Fourth Street Option of Alternatives Three and Five would be approximately 6,500 vehicle-hours, an increase of 170 percent over the existing condition. Vehicle-hours for the Second Street Option and the Fourth Street Option of Alternatives Three and Five would be higher than the Existing Ramp Connections scenario in part because of the higher number of vehicles that would access the freeway system under Alternatives Three and Five (an increase of nine percent over the Existing Ramp Connections scenario).

System-wide average travel time per vehicle would increase during the PM peak period from four minutes under the existing condition to six minutes under the Existing Ramp Connections scenario, and approximately eight minutes under the Second Street Option and the Fourth Street Option of Alternatives Three and Five. This indicates that the freeway would experience higher congestion levels under all alternatives, particularly under Alternatives Three and Five, when compared to the existing condition; and it would take 50% to 100% longer for a vehicle to travel the same distance, potentially extending the PM peak period.

The PM peak period freeway system speed would decrease from the existing 50 km/h (31 mph) to 20 km/h (18 mph) under the Existing Ramp Connections scenario, and would decrease further under the Second Street Option and the Fourth Street Option of Alternatives Three and Five, to 18 km/h (11 mph).

I-80 Eastbound Operation

Similar to the westbound operation, freeway speeds in the eastbound direction would decrease in all alternatives during both the AM and PM peak periods when compared to the existing conditions (Table 4.5-11).

During the AM peak period, total travel time would increase from the existing 1,700 vehicle-hours to 3,100 vehicle-hours under the Existing Ramp Connections scenario, an increase of 82 percent over the existing condition. Total travel time for the Second Street Option and the Fourth Street Option of Alternatives Three and Five would be approximately 5,100 vehicle-hours, an increase of 200 percent over the existing condition. Vehicle-hours for Alternatives Three and Five would be higher when compared to the other alternatives in part because of the higher number of vehicles that would access the freeway system under Alternatives Three and Five (an increase of 17 percent).

The AM peak period system-wide average travel time per vehicle would increase from four minutes under the existing condition to six minutes under the Existing Ramp Connections scenario, and to approximately eight minutes under the Second Street Option and the Fourth Street Option of Alternatives Three and Five. The freeway would experience higher congestion levels in the future when compared to the existing condition, and it would take 50% to 100% longer for a vehicle to travel the same distance, potentially extending the AM peak period.

The AM peak period freeway system speed would decrease from the existing 56 km/h (35 mph) to 29 km/h (18 mph) under the Existing Ramp Connections scenario, and would decrease even more under the Second Street Option and the Fourth Street Option of Alternatives Three and Five, to 18 km/h (11 mph).

During the PM peak period, total travel time would increase from the existing 1,800 vehicle-hours to 3,800 vehicle-hours under the Existing Ramp Connections scenario, an increase of 111 percent over the existing condition. Total travel time for the Second Street Option and the Fourth Street Options of Alternatives Three and Five would be approximately 4,300 vehicle-hours, an increase of 136 percent over the existing condition.

The PM peak period system-wide average travel time per vehicle would increase from 3.5 minutes under the existing condition to seven minutes under the Existing Ramp Connections scenario, and to approximately eight minutes under the Second Street Option and the Fourth Street Option of Alternatives Three and Five. The freeway would experience higher congestion levels under future conditions when compared to existing, and it would take about 100% longer for a vehicle to travel the same distance, potentially extending the PM peak period.

The PM peak period freeway system speed would decrease from the existing 43 km/h (27 mph) to 19 km/h (12 mph) under the Existing Ramp Connections scenario, and would be slightly lower under the Second Street Option and the Fourth Street Option of Alternatives Three and Five (approximately 11 mph).

DPT Variant

As described in the Alternatives Section (pp. 87-88), the San Francisco Department of Parking and Traffic (DPT) has proposed a compromise version of Alternative Four and the Fourth Street Option of Alternatives Three and Five. This variant would be identical to the Fourth Street Option of Alternatives Three and Five, except that it would omit the new on-ramp to I-80 Westbound proposed in those alternatives, and would not immediately implement operational changes to the existing Sterling Street and Essex Street on-ramps to I-80 Eastbound. (These changes would be implemented when warranted by congestion levels -- sometime before the future analysis year of 2015.)

It is unclear whether Caltrans and FHWA would consider this variant eligible for “ER” funds, although the resulting demand-to-capacity ratio at freeway on-ramps in the PM peak hour would be .91, which is virtually identical to Alternatives Three and Five (which have been determined eligible for “ER” funds). As shown in Table 4.5-6, the same ratio would be slightly worse than the existing ratio of .86, and slightly better than the pre-earthquake ratio of 1.16. In the AM peak hour, the variant's demand-to-capacity ratio of .88 at off-ramps would be identical to the Fourth Street Option of Alternatives Three and Five, and would be similar to existing and pre-earthquake values (.90 and .84, respectively).

In terms of traffic volumes, congestion on local streets, and freeway access, impacts of the DPT Variant would generally fall somewhere between levels projected for Alternative Four, and levels projected for the Fourth Street Option of Alternatives Three and Five. In the AM peak hour, traffic volumes and intersections' levels of service at intersections along the Third, Fourth, and Fifth Street corridors would be similar to those under the Fourth Street Option of Alternatives Three and Five, except at the intersection of Harrison and Fourth Streets, which would function at LOS B, similar to Alternative Four which would maintain the existing capacity of the Fourth Street on-ramp. (The intersection reaches LOS F in the AM peak hour under the Fourth Street Option of Alternatives Three and Five due to a 500 vehicle per hour decrease in on-ramp capacity.)

In the PM peak hour, traffic volumes and intersections' levels of service at intersections along the Third, Fourth, and Fifth Street corridors would be similar or identical to those under Alternative Four, and the differences between all the alternatives would be relatively minor (Harrison/Fourth would function at LOS E or F under the DPT Variant and all alternatives.)

Access from the regional freeway system to downtown San Francisco would be similar to that under the Fourth Street Option of Alternative Three and Five, while access between downtown and the regional freeway system would be similar to that under Alternative Four.

Conditions on the westbound I-80 freeway would be similar to conditions under Alternative Four with speeds of about 25 mph on the mainline during the AM peak period and about 20 mph in the PM peak period. This similarity would occur because the DPT Variant would omit the westbound on-ramp proposed under Alternatives Three and Five, so that the existing fourth Street on-ramp would remain as a lane-add where it meets the freeway, instead of becoming a merge-lane. Alternatives Three and Five (with the new on-ramp) would produce speeds of about 23 mph on the mainline during the AM peak period, and about 13 mph in the PM peak period.

Conditions on the eastbound I-80 freeway would be similar to conditions under the Fourth Street Option of Alternatives Three and Five, with the widened on-ramp at Fourth Street primarily benefitting the AM peak period, when the existing ramp functions at or near capacity. System speeds would be slower than under Alternative Four, due to the higher number of vehicles entering the system. (See Table 4.5-11.)[16]

Construction Period Traffic

A preliminary stage construction plan for the project alternatives was prepared to provide a basis for construction period impact analysis[17]. Key traffic components of this plan are summarized below. It should be noted that Caltrans and the City have not determined which agency will design and construct proposed ramp structures.

- In all build alternatives, the Embarcadero roadway between Folsom Street and Broadway would be constructed in two stages; each stage would last approximately eight months. During each stage, construction would be restricted to one-half of the roadway, with the other half available for three traffic lanes in each direction of travel between Howard Street and Broadway at all times. Portions of the existing median would be used and existing curb parking would be eliminated on both sides of the roadway to provide the required number of lanes. Existing intersections and access to properties along The Embarcadero would remain open at all times by using temporary paving.

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[16] For further information on traffic conditions projected as a result of the DPT Variant, see May 12, 1995 memorandum from Jack Fleck of the Department of Parking and Traffic to Hillary Gitelman, and addendum dated June 15, 1995. Copies of these documents are available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street.

[17] Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure, "Preliminary Stage Construction Plan," Parsons Brinckerhoff Quade & Douglas, October 1994.

- In all build alternatives, construction of the F-Line trackbed in the Embarcadero median would begin upon completion of all traffic lanes and pedestrian facilities, and would last approximately four months (for a total construction duration of 20 months along The Embarcadero). During the F-Line trackbed construction, the Embarcadero roadway would be open to traffic and all planned accesses to and from the roadway would be maintained.

- Construction of the Fremont Street off-ramp in Alternatives Three, Four and Five would occur after the completion of the first stage construction on The Embarcadero. Construction of the off-ramp would last approximately 12 months; during which time, the existing off-ramp and surrounding streets (Fremont, Folsom and First Streets) would remain open at all times. Temporary lane reductions on surrounding streets would occur during construction of the Folsom / Fremont intersection. Any temporary lane reduction would be restricted to off-peak hours or nighttime.

- Construction of the Harrison Street I-80 westbound on-ramp and widening of the I-80 structure between Fourth and Sixth Streets under Alternatives Three and Five would occur concurrently, and would last about 21 months. No I-80 westbound lanes would be closed but lane widths would be reduced to 3.3 meters (11 feet) through the construction area. Temporary lane reduction on Harrison, Second and Fourth Streets would occur at nighttime but on different days, and would involve a short segment (one block) of these streets.

- Construction of the I-80 eastbound off-ramp at Second Street (Second Street Option of Alternatives Three and Five) would last about 15 months. No lane reduction on I-80 eastbound would be required but lane widths would be narrowed to 3.3 meters (11 feet) between Second and Fourth Streets. Temporary lane reduction on Second and Third Streets would occur during nighttime, but on different days.

- Widening of the existing Fourth Street off-ramp and I-80 eastbound from Fourth Street to Sixth Streets (Fourth Street Option under Alternatives Three and Five) would take 18 months to complete. No lane closures on I-80 eastbound or on the existing Fourth Street off-ramp would occur, but I-80 eastbound lanes would be narrowed to 3.3 meters (11 feet) from Sixth to Fourth Streets. No lane closures would be required on surface streets during period of construction.

- Construction of traffic improvements, proposed under all build alternatives, on First Street, Fremont Street, Third Street, Bryant Street and Drumm Street would last approximately two months. No lane closures would be required on the these streets during peak traffic hours.

- Construction of Davis Street between Washington and Clay Streets (Alternative Three and Five) would require approximately five months. No lane closures would be required on surrounding streets (Clay and Washington Streets).

- Implementation of operational changes on Bryant and Essex Streets would not require lane closures on these streets.

Construction activities associated with any of the build alternatives would not require complete ramp or street closures at any time during the construction period. Temporary lane reductions on surface streets would be restricted to off-peak hours or during nighttime. Construction activities would be staged throughout the project area such that not all locations would be under construction all of the time.

Local streets would experience increased construction traffic during implementation of any one of the build alternatives, with Alternatives Three and Five generating more construction traffic than Alternatives Two and Four because of the new freeway ramps. Construction of the Embarcadero roadway would generate approximately 200 truck trips per day based on the estimated amount of soils to be excavated and transported off the site (see Section 4.14). Construction of the freeway ramps would generate a lesser amount, approximately 40 truck trips per day. Most of the construction truck trips would be between the construction sites and approved landfills south of the City. Therefore, streets on the access route such as The Embarcadero, King, Bryant, Folsom, Second and Third Streets would experience more construction traffic than other local streets.

Traffic Mitigation Measures

As described in the previous sections, traffic congestion within the study area would occur in the future, in part due to background traffic growth, at the same general locations as occurs today, but with longer delays and worse levels of service. Localized congestion would occur on those streets providing access to and from the freeway system, such as Battery Street, First Street, Harrison Street, Second Street, Third Street, Fourth Street, Bay Street, Broadway, Townsend Street. Alternatives Three and Five would cause slightly worse peak hour congestion near the I-80 westbound on-ramps because of changes to the existing configuration of the Fourth Street on-ramp (from a lane-add to a lane-merge) due to the addition of the new Harrison Street/Second Street on-ramp.

Based on the results of the traffic analysis described in the previous sections, several common mitigation measures have been developed for the build alternatives. These mitigations include possible measures to improve traffic flow in the local street network and reduce congestion at selected locations. Transit circulation would also benefit from these measures:

- In order to reduce peak period traffic congestion on Battery and First Streets, install signs on Battery and Clay Streets directing southbound drivers to use Clay, Davis, and Beale Streets as an alternate route to South of Market destinations, including ramps to the Bay Bridge. Also, eliminate the nine left-side curb loading/parking spaces on Battery Street between Pine and Bush Streets in the AM peak period. (Stopping is already prohibited in the PM peak period.)

- In order to reduce delays in accessing the freeway, the Harrison Street approach to the I-80 on-ramp at Fourth Street would be restriped to add another exclusive lane to the freeway. This restriping would require either removing the existing safety cones on Fourth Street, which force southbound traffic at the west curb lane to turn right, or by adding striping through the intersection, directing westbound through traffic on Harrison Street around the cones. The restriping would require removal of up to 76 on-street parking spaces in the area, and would be accompanied by a sign program alerting South of Market drivers to other on-ramps farther west.

  The existing configuration of Harrison Street includes one shared left-turn and freeway access lane, one shared freeway access and through lane, and two through lanes. The final configuration of Harrison Street would include one left turn-only lane, two freeway-only lanes, and three through lanes. All changes would be implemented when the intersection's level of service degrades from its existing LOS of B, to LOS E or F in the PM peak hour, as projected to occur by 2015.

The mitigation measures described above are conceptual in nature and deemed feasible at the planning level.

Additional improvements not specifically described above include improvements to the condition, adequacy and location of destination guide signs to areas such as Chinatown, North Beach and Fisherman's Wharf from the freeways, as well as guide signing for visitors returning to the freeway from those areas. The City's Department of Parking and Traffic is currently developing a signing program. Another improvement not specifically described includes signal timing changes that would provide additional green time to the longest queues at congested intersections. Streets providing access to Chinatown (Broadway, Stockton, Grant) would benefit from the two-phase traffic signal system upgrade proposed as part of all build alternatives. Other minor signal timing adjustments are typically implemented by the City's Department of Parking and Traffic on an as needed basis. Under projected future conditions, the intersections of Embarcadero/Bay, Townsend/Third, and Folsom/Fourth would benefit particularly.

Similarly, implementation of variable message signs (VMS) and sign control systems, informing drivers of current traffic conditions and directing vehicles to access the freeway through alternate routes and ramps in the case of a freeway incident, would work to alleviate congestion on the local streets approaching the Bay Bridge, as well as on the cross-streets. The VMS network could be supplemented with a video camera system, which would monitor traffic conditions at several key intersections, relaying that information to a central location, from where rerouting plans could be automatically implemented. The Department of Parking and Traffic is scheduled to receive funding from federal sources to implement a video camera network to enable the dispatch of Parking Control Officers (PCOs) to critical locations in case of severe backups on the Bay Bridge.

One specific example would be the use of VMS to encourage southbound cars on Battery Street to turn left at Clay Street, and then right at Davis Street. Under the No Build Alternative or Alternative Two there is little incentive to do this since Davis Street leads to Beale Street, and Beale would lead to the HOV on-ramp at Sterling Street. However, under Alternatives Three, Four and Five the Sterling Street on-ramp would become mixed-flow, therefore providing a good alternate route to the Bay Bridge. A VMS sign located on Battery Street before Clay Street and connected to loop detectors on First Street could advise motorists to use the Sterling Street on-ramp as an alternative to the First Street on-ramp. The loop detectors would activate the VMS whenever traffic is queued on First Street.

Mitigated Results

Once the proposed mitigation measures described in the previous section are implemented, the overall street system performance would improve under all future build alternatives. There would not be substantial differences between the unmitigated and mitigated overall performance of the four build alternatives, except in the vicinity of the locations where the mitigation measures are implemented.

Table 4.5-12 presents the LOS for the primary study area intersections during AM and PM peak hours, for all five alternatives, under mitigated conditions.

During the AM Peak Hour, LOS at the intersection of Battery Street and Bush Street would improve from E/F to D for all alternatives due to diversion of southbound traffic to other streets, elimination of left-side parking/loading spaces, and changes in lane configuration at the Market Street/Bush Street intersection.

LOS at the intersection of Fourth Street and Harrison Street would improve under Alternatives Three and Five, from LOS F to LOS E, with the restriping of the westbound approach to the intersection.

In the PM Peak Hour, LOS at the intersection of Battery Street and Bush Street would improve from F to D for all alternatives due to diversion of southbound traffic to other streets, and changes in lane configuration at the Market Street/Bush Street intersection. The intersection of Fourth Street and Harrison Street would experience reduced average delay under all alternatives, and improves the LOS, from F to E, under Alternatives Three and Five. The intersections of Fourth Street at Folsom Street and at Howard Street would have reduced average delay under all alternatives because of reduced southbound queues on Fourth Street.

Construction Period Traffic Mitigation

- In order to reduce inconveniences associated with temporarily reduced street capacity and restricted traffic circulation during construction, the City would require construction contractors to restrict any street lane reductions to off-peak or nighttime hours and notify the City of such occurrences in advance. Alternatively, if lane closures are required in peak periods, alternate lanes would be made available by restricting curb-side parking and loading.

- In order to reduce the potential effect of construction traffic on local streets, the City would require construction contractors to restrict construction traffic and stage construction activities so as to prevent concentration of construction traffic on corridors with limited capacity or corridors used by commute traffic.

Possible Future Projects

As discussed in Section 2.3, Section 4.1.3, and under the Future Travel Forecasts heading above, the 2015 future context includes related transportation projects and reasonably foreseeable future development projects assumed as part of the cumulative development scenario used to estimate travel demand. In general, reasonably foreseeable future projects include transit improvements that the Metropolitan Transportation Commission (MTC) anticipates will be operational by 2010, approved but unbuilt development projects, planned projects such as the Gap Building and the Ferry Building Rehabilitation, and projected, non-site-specific increases in downtown employment. For the purposes of the traffic analysis, some of the projected increases in employment have been assigned to areas (Traffic Analysis Zones or TAZs) that include sites of the former Embarcadero Freeway and TSS.

Several possible future projects were considered too speculative or remote at the time this document was written to be included in the definition of future context. The discussion below generally describes these possible future projects, their current status, and their likely effect on potential cumulative impacts described in this EIS/EIR.

TABLE 4.5-12
SIGNALIZED INTERSECTION LOS SUMMARY
MITIGATED CONDITIONS
PRIMARY STUDY AREA
AM AND PM PEAK HOURS

INTERSECTION	2015 MIT ALT 2		2015 MIT ALT 3		2015 MIT ALT 4		2015 MIT ALT 5	
	AM	PM	AM	PM	AM	PM	AM	PM
Harrison & First	A	C	A	C	A	C	A	C
Harrison & Fremont	B	A	B	A	B	A	B	A
Harrison & Main	B	B	B	B	B	B	B	B
Harrison & Spear	B	B	B	B	B	B	B	B
Harrison & Essex	A	C	B	D	A	B	B	D
Folsom & First	A	B	B	B	B	B	B	B
Folsom & Fremont	C	B	D	B	D	B	D	B
Folsom & Beale	A	B	B	B	B	B	B	B
Folsom & Main	B	B	B	A	B	A	B	A
Folsom & Spear	A	B	A	B	A	B	A	B
Folsom & Steuart	C	C	C	C	C	C	C	C
Howard & First	B	B	B	C	B	B	B	C
Howard & Fremont	B	B	B	B	B	B	B	B
Howard & Beale	B	A	B	A	B	A	B	A
Howard & Main	B	B	B	B	B	B	B	B
Howard & Spear	B	B	B	B	B	B	B	B
Howard & Steuart	B	B	B	B	B	B	B	B
Mission & First	B	B	B	B	B	B	B	B
Mission & Fremont	B	B	B	B	B	B	B	B
Mission & Beale	B	B	B	B	B	B	B	B
Mission & Main	B	B	B	B	B	B	B	B
Mission & Spear	B	B	B	B	B	B	B	B
Mission & Steuart	B	B	B	B	B	B	B	B
Market & Sansome	A	A	A	A	A	A	A	A
Market & Battery	B	C	B	C	B	C	B	C
Market & Fremont	B	B	B	B	B	B	B	B
Market & Beale	A	B	A	B	A	B	A	B

Source: Korve Engineering, Inc.; Parsons Brinckerhoff Quade & Douglas, Inc.

NOTE 1: 2015 mitigated conditions under Alternative Three were projected using the TRAF-NETSIM model and the street network for the Second Street Option. For more details, please see Technical Memorandum: Refinement of the Battery Street/Market Street/Pine Street Traffic Mitigation Measures, June 30, 1995, prepared by Korve Engineering, Inc. A copy of this technical memorandum is available for public review at the San Francisco Planning Department, 1660 Mission Street.

NOTE 2: 2015 mitigated conditions under Alternatives Two, Four and Five were estimated based on earlier (November 1994) TRAF-NETSIM model results for all build alternatives and the June 1995 model results for Alternative Three.

TABLE 4.5-12 (Continued)
SIGNALIZED INTERSECTION LOS SUMMARY
MITIGATED CONDITIONS
PRIMARY STUDY AREA
AM AND PM PEAK HOURS

INTERSECTION	2015 MIT ALT 2		2015 MIT ALT 3		2015 MIT ALT 4		2015 MIT ALT 5	
	AM	PM	AM	PM	AM	PM	AM	PM
Sansome & Bush	B	B	B	B	B	B	B	B
Sansome & Pine	B	B	B	B	B	B	B	B
Sansome & California	B	B	B	B	B	B	B	B
Sansome & Sacramento	B	B	B	B	B	B	B	B
Sansome & Clay	B	B	B	B	B	B	B	B
Sansome & Washington	B	A	B	B	B	B	B	B
Sansome & Jackson	A	B	A	A	A	A	A	A
Sansome & Pacific	A	A	A	A	A	A	A	A
Sansome & Broadway	B	B	B	B	B	B	B	B
Battery & Bush	D	D	D	D	D	D	D	D
Battery & Pine	B	B	B	B	B	B	B	B
Battery & California	A	B	A	B	A	B	A	B
Battery & Sacramento	B	B	B	B	B	B	B	B
Battery & Clay	B	B	B	B	B	B	B	B
Battery & Washington	A	A	A	A	A	A	A	A
Battery & Jackson	A	A	A	A	A	A	A	A
Battery & Pacific	A	A	A	B	A	A	A	B
Battery & Broadway	B	B	B	B	B	B	B	B
Front & Pine	A	A	A	A	A	A	A	A
Front & California	B	A	B	A	B	A	B	A
Front & Sacramento	B	B	B	B	B	B	B	B
Front & Clay	B	A	B	A	B	A	B	A
Front & Broadway	B	B	B	B	B	B	B	B
Davis & California	A	A	A	A	A	A	A	A
Davis & Sacramento	B	B	B	B	B	B	B	B
Davis & Broadway	A	B	B	B	A	B	B	B

Source: Korve Engineering, Inc.; Parsons Brinckerhoff Quade & Douglas, Inc.

NOTE 1: 2015 mitigated conditions under Alternative Three were projected using the TRAF-NETSIM model and the street network for the Second Street Option. For more details, please see Technical Memorandum: Refinement of the Battery Street/Market Street/Pine Street Traffic Mitigation Measures, June 30, 1995, prepared by Korve Engineering, Inc. A copy of this technical memorandum is available for public review at the San Francisco Planning Department, 1660 Mission Street.

NOTE 2: 2015 mitigated conditions under Alternatives Two, Four and Five were estimated based on earlier (November 1994) TRAF-NETSIM model results for all build alternatives and the June 1995 model results for Alternative Three.

TABLE 4.5-12 (Continued)
SIGNALIZED INTERSECTION LOS SUMMARY
MITIGATED CONDITIONS
PRIMARY STUDY AREA
AM AND PM PEAK HOURS

INTERSECTION	2015 MIT ALT 2		2015 MIT ALT 3		2015 MIT ALT 4		2015 MIT ALT 5	
	AM	PM	AM	PM	AM	PM	AM	PM
Drumm & Clay	A	B	A	B	B	B	A	B
Drumm & Washington	B	B	B	B	B	B	B	B
Second & Brannan	C	B	B	B	B	B	B	B
Second & Bryant	B	C	B	C	B	B	B	C
Second & Harrison	B	D	B	B	B	B	B	B
Second & Folsom	B	B	C	B	B	B	C	B
Second & Howard	A	B	B	B	A	B	B	B
Second & Mission	B	B	B	B	B	B	B	B
Second & Market	A	A	A	B	A	A	A	B
Bryant & Beale	B	B	B	B	B	B	B	B
Bryant & Main	B	C	A	B	B	B	A	B
The Embarcadero & Bryant	C	B	C	B	C	B	C	B
The Embarcadero & Brannan	C	C	C	C	C	C	C	C
The Embarcadero & Harrison	B	B	B	B	B	B	B	B
The Embarcadero & Folsom	B	B	C	B	C	B	C	B
The Embarcadero & Howard	A	A	A	A	A	A	A	A
The Embarcadero & Mission	B	A	B	B	B	B	B	B
The Embarcadero & Washington	B	B	B	B	C	C	B	B
The Embarcadero & Broadway	C	C	C	D	C	D	C	D
I-80 EB Off-Ramp @ Second St	- - - -		B	B	- - - -		B	B
New Montgomery & Howard	B	B	B	B	B	B	B	B
New Montgomery & Mission	B	B	B	B	B	B	B	B
New Montgomery & Market	B	C	B	C	C	C	B	C
Third Street & Brannan	B	B	B	B	B	B	B	B
Third Street & Bryant	B	B	B	B	B	B	B	B

Source: Korve Engineering, Inc.; Parsons Brinckerhoff Quade & Douglas, Inc.

NOTE 1: 2015 mitigated conditions under Alternative Three were projected using the TRAF-NETSIM model and the street network for the Second Street Option. For more details, please see Technical Memorandum: Refinement of the Battery Street/Market Street/Pine Street Traffic Mitigation Measures, June 30, 1995, prepared by Korve Engineering, Inc. A copy of this technical memorandum is available for public review at the San Francisco Planning Department, 1660 Mission Street.

NOTE 2: 2015 mitigated conditions under Alternatives Two, Four and Five were estimated based on earlier (November 1994) TRAF-NETSIM model results for all build alternatives and the June 1995 model results for Alternative Three.

TABLE 4.5-12 (Continued)
SIGNALIZED INTERSECTION LOS SUMMARY
MITIGATED CONDITIONS
PRIMARY STUDY AREA
AM AND PM PEAK HOURS

INTERSECTION	2015 MIT ALT 2		2015 MIT ALT 3		2015 MIT ALT 4		2015 MIT ALT 5	
	AM	PM	AM	PM	AM	PM	AM	PM
Third Street & Harrison	B	B	B	C	B	B	B	C
Third Street & Folsom	B	B	B	B	B	B	B	B
Third Street & Howard	B	B	B	B	B	B	B	B
Third Street & Mission	B	C	B	C	B	C	B	C
Third Street & Market	C	B	B	B	C	B	B	B
Fourth Street & Brannan	B	B	B	B	B	B	B	B
Fourth Street & Bryant	C	C	B	C	C	C	B	C
Fourth Street & Harrison	B	E	E	E	B	E	E	E
Fourth Street & Folsom	B	E	D	E	B	E	D	E
Fourth Street & Howard	B	C	B	B	B	C	B	B
Fourth Street & Mission	B	B	B	B	B	B	B	B
Fourth Street & Market	B	B	B	B	B	B	B	B
Fifth Street & Brannan	B	B	B	B	B	B	B	B
Fifth Street & Bryant	B	C	B	C	B	C	B	C
Fifth Street & Harrison	C	C	C	C	C	C	C	C
Fifth Street & Folsom	C	B	C	B	C	B	C	B
Fifth Street & Howard	D	B	D	C	D	C	D	C
Fifth Street & Mission	D	A	D	B	D	A	D	B
Fifth Street & Market	C	C	C	C	C	C	C	C
Sixth Street & Brannan	B	B	B	C	B	B	B	C
Sixth Street & Bryant	B	B	B	B	B	B	B	B
Sixth Street & Harrison	B	B	B	B	B	B	B	B
Sixth Street & Folsom	B	B	B	B	B	B	B	B
Sixth Street & Howard	B	B	B	B	B	B	B	B
Sixth Street & Mission	B	B	B	B	B	B	B	B
Sixth Street & Market	B	B	B	B	B	B	B	B

Source: Korve Engineering, Inc.; Parsons Brinckerhoff Quade & Douglas, Inc.

NOTE 1: 2015 mitigated conditions under Alternative Three were projected using the TRAF-NETSIM model and the street network for the Second Street Option. For more details, please see Technical Memorandum: Refinement of the Battery Street/Market Street/Pine Street Traffic Mitigation Measures, June 30, 1995, prepared by Korve Engineering, Inc. A copy of this technical memorandum is available for public review at the San Francisco Planning Department, 1660 Mission Street.

NOTE 2: 2015 mitigated conditions under Alternatives Two, Four and Five were estimated based on earlier (November 1994) TRAF-NETSIM model results for all build alternatives and the June 1995 model results for Alternative Three.

Transbay Terminal

The San Francisco Redevelopment Agency and the Planning Department of the City and County of San Francisco, in cooperation with Caltrans and affected transit operators, are engaged in a feasibility study regarding the Transbay Terminal at Mission, First, and Fremont Streets. The study analyzes improvement options including building a new terminal on the existing site and relocating the terminal to a site bounded by Main, Beale, Howard, and Mission Streets. One goal is to link the terminal functions to a new CalTrain station. If the relocation were to occur, existing overhead ramps would be reconstruced, transit operations would shift to the new site, and the existing site could be made available for alternative land uses. If the terminal were to remain in its existing location, it is possible that existing overhead ramps would be reconstructed, and the terminal's configuration would likely change.

Potential changes to the 2015 future context as a result of this possible future project are difficult to anticipate, but would likely include increased efficiencies for transit vehicles at the terminal and increased delays for transit vehicles approaching the terminal from the west or north via city streets. Changes in transit vehicle delay would be more dramatic if functions currently conducted at MUNI's Steuart Street layover lot were shifted to the new facility. Traffic operations would probably not be affected in most of the Mid-Embarcadero/TSS primary and secondary study areas, but could improve or deteriorate at intersections in the immediate vicinity of the Transbay Terminal. Visually, the immediate vicinity would also be different, with the removal of the existing Transbay Terminal and the reconfiguration or consolidation of existing ramps.

Rincon Hill Arena

Rincon Hill is one of two sites in San Francisco, and one of four sites in the greater Bay Area being considered for construction of a new arena for the Golden State Warriors basketball team. The other sites are in the Mission Bay area of San Francisco, in Oakland, and in San Jose. The San Francisco Planning Department has recently begun preparing an environmental impact report to evaluate potential environmental effects of the Rincon Hill arena project and possible alternatives.

The proposed arena, with a capacity of about 21,000 seats, would be located on the blocks bounded by Folsom, Spear, Harrison, and Beale Streets, and would require the closure of Main

Street between Folsom and Harrison Streets. The arena might also require that Folsom Street be realigned to curve-out towards the north between Beale and Spear Streets, using a portion of the right-of-way formerly used by the Terminal Separator Structure.

Past studies of downtown sports facilities considered sites at Seventh and Townsend Streets and Second and King Streets.[18] These studies projected that 13 to 18 percent of patrons would use transit. At the Rincon Hill site, transit ridership would likely be higher, and would probably approach or exceed percentages experienced at the Oakland Coliseum (21%) and the Seattle Kingdome (25%). Similar to Wrigley Field in Chicago and Fenway Park in Boston, the percentage of patrons using transit could even be as high as 50 percent due to the easy access to transit systems and the possibility that downtown workers could walk or shuttle to events after work.

Arena-related changes to local traffic conditions and transit vehicle delay projected for 2015 would depend on many factors, including event schedules and the amount and location of off-street parking in the area. Based on event types and frequencies at the Oakland Coliseum, it is likely that the majority of events (about 60% of a total of about 170 annual events) would occur on weekdays, with about 40 percent occurring on weekends. Of the weekday events, about 65 to 75 percent would be night basketball games, which would probably start at 7:30, after the PM Peak Hour. About 25 to 35 percent of weekday events (26 to 36 annual events) would occur during the daytime, when there is a possibility that exiting traffic could overlap with the PM Peak Hour.[19]

Based on a mode split assumption that 70 percent of arena attendees would arrive by auto (although only 40 percent of those arriving from work in San Francisco would come by auto), and an auto-occupancy rate of 2.75 persons per auto derived from existing rates at the Oakland Coliseum and Candlestick Park, the total number of automobile trips to a sell-out event at the arena would be about 7,000. Automobile trips to and from the arena would end and begin from parking lots in the vicinity, and from a 1,200 to 1,500 space parking garage proposed as part of the arena project. The preliminary concept for the arena garage would create entrances and exits on Spear Street and on Harrison Street.

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[18] San Francisco Department of City Planning, 86.505E: Draft Supplemental to the Mission Bay Draft EIR, published March 17, 1989 and incorporated as Appendix M in the Mission Bay Final EIR, certified August 23, 1990.

[19] Information in this and subsequent paragraphs is from Korve Engineering, Inc., "Draft Downtown San Francisco Arena Traffic Feasibility Analysis" prepared for the San Francisco Planning Department, February 24, 1994.

Changes caused by such a project would clearly include reduced local circulation due to the closure of Main Street between Folsom and Harrison Streets, and the possible relocation of Folsom Street between Beale and Spear Streets. About 500 to 700 PM Peak Hour trips would probably shift from Main Street, increasing congestion on Spear and Fremont Streets.

Before and after events, arena traffic would increase traffic volumes and congestion levels on streets in the vicinity, particularly on corridors connecting parking areas near the arena to the freeway system. Traffic travelling inbound or outbound to/from the arena would be distributed along east-west streets including Harrison Street, Folsom Street, and Bryant Street, and along north-south streets including First Street, Fremont Street, Beale Street, Spear Street, and the Embarcadero. Arena traffic would make use of existing freeway on- and off-ramps, and would benefit in terms of access from new ramps proposed in Mid-Embarcadero/TSS Alternatives Three and Five, and from the modification to the Fremont/Folsom Street off-ramp proposed in Alternatives Three, Four, and Five. In terms of congestion on City streets, Alternatives Three and Five would have the greatest traffic volumes, and therefore the highest levels of congestion during peak periods. With or without the arena, PM Peak Hour congestion would be centered mostly on Fourth Street and First Street. If patrons were exiting the arena immediately before, after, or during the PM Peak Hour, this congestion would be worse, and traffic accessing the new on-ramp proposed at Second and Harrison Streets under Alternatives Three and Five, could conflict with traffic heading towards the First Street on-ramp, causing greater than normal queuing along First Street, Harrison Street, and connecting routes.

Based on its potential transit demand, the arena could cause transit loading impacts, requiring the expansion of existing transit services. Also, Muni's 80-X, 81-X, 82-X bus routes, which currently use Main and/or Folsom Street in AM peak periods, would need to be re-routed and could experience delays as a result. Golden Gate Transit's Route 67 and 69 could also be affected, as would the location and operation of Golden Gate Transit's layover yard south of Folsom Street, between Main and Spear Streets. Average per bus delay is not projected to increase due to construction of any of the build alternatives being considered as alternatives to the Embarcadero Freeway and the TSS, and thus the Mid-Embarcadero/TSS project would not contribute to likely cumulative increases in average transit delay resulting from arena-related changes to local circulation. The Mid-Embarcadero/TSS project would also not increase transit loading and thus would not contribute to this cumulative effect.

Freeway access would be impaired if the arena contributed to increased congestion on Harrison Street, thereby preventing vehicles from accessing freeway ramps near First Street, or if increased volumes on Folsom or Fremont Streets due to the arena prevented vehicles from efficiently exiting the freeway system. The freeway itself is projected to operate at capacity in the PM peak period by 2015, and the addition of traffic going to or exiting the arena could not therefore increase congestion levels, but would likely increase the amount of time that the freeway would operate at capacity. This extension of the afternoon peak period would be likely to occur whether arena events began or ended during the peak period or whether they began or ended immediately before or after the peak.

Changes in parking conditions, pedestrian activity, views, wind, and shadow could result from the arena project, although none would cause a significant cumulative impact when combined with effects of the Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure as described elsewhere in this EIS/EIR. All project-specific effects of the proposed arena will be analyzed in the EIR prepared for that purpose.

Mission Bay Sports and Entertainment Complex

The future context assumes that employment and population growth will occur in the Mission Bay area by the year 2015. Although the anticipated growth (19,708 net new jobs and 6,255 net new households) does not equal amounts assumed in the Mission Bay EIR (certified August 23, 1990), it does assume that the current development agreement between the City and the property owner will provide the framework for future development.[20] Catellus, the developer of Mission Bay is considering a portion of the area as a possible location for a baseball stadium, an arena, and an entertainment and/or retail center. These activities would occur on sites identified for office development in the development agreement, and would stretch along King Street, from the Bay to Sixth Street. The ballpark would be at one end, with the arena at the other end, and the entertainment/retail component would be in between.

If a sports and entertainment complex is formally proposed to the City and approved in modifications to the Mission Bay development agreement, some of the person trips assumed for Mission Bay would be replaced by other trips, and other, new trips would have to be accommodated on local streets, transit systems, and regional freeway connections. As with the

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[20] ABAG '92 (R) Projections distributed to Traffic Analysis Zones (TAZs) 657 and 658. Adjustment from 2010 to 2015 by the San Francisco Planning Department.

Rincon Hill arena described above, changes to local traffic conditions and other transportation systems projected for 2015 are difficult to anticipate, and would depend on many factors, including event schedules, the exact mix of uses, and the amount and location of off-street parking in the area.

The analysis of an arena and stadium incorporated as Appendix M in the Mission Bay EIR considered the potential effects of a similar arena and stadium concept with office uses, rather than entertainment, in between. That analysis, which also assumed higher levels of development in the rest of Mission Bay and the greater downtown, projected that by year 2000, the additional vehicle trips generated by sports facilities would extend peak traffic conditions, and regional freeways would operate at capacity for longer periods of time. In general, local intersections south of the I-80 Freeway were projected to experience congestion before and after sports events that would equal or exceed congestion levels experienced in the PM Peak Hour. North of the I-80 Freeway, (like at the intersection of Fourth and Harrison Streets), congestion before and after sports events were projected to be the same or slightly better than in the PM peak hour.[21]

In keeping with the Mission Bay analysis cited above, the highest traffic volume increases due to a sports and entertainment complex would likely occur south of Bryant Street, on the Embarcadero Roadway, Fourth Street, and Fifth Street, and in the immediate vicinity of the complex. Increases in delay and worse levels of service (LOS) would occur at area intersections along these routes.

Traffic increases on East-West streets would be less than on the streets described above, except possibly on Folsom Street eastbound, where volumes could increase. Changes to average vehicle delay and LOS would likely occur, but would not degrade intersections to unacceptable levels of service, except at Fourth and Fifth Streets. Increases in freeway off-ramp volumes would occur in the off-peak direction where additional capacity is available at most locations. Only the Fifth Street westbound off-ramp would experience congestion, with demand exceeding capacity by approximately 10%. Traffic increases at on-ramps would likely be minimal, and would not affect demand-to-capacity ratios.[22]

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[21] San Francisco Planning Department, Mission Bay Final Environmental Impact Report, Certified August 23, 1990, vol. 3, Appendix M, pp. XIV.M.1-40. The analysis contained in Appendix M of the Mission Bay EIR is incorporated here by reference. A copy of the Mission Bay EIR, including appendices, is available for public review at the San Francisco Planning Department, 1660 Mission Street

The Bay Bridge westbound would experience an increase in volumes, such that volumes would approach the Bridge's capacity. Increased volumes in the eastbound direction would be minimal. The ultimate effect (in both directions) would likely be an extension of the peak period.

Just as with the Rincon Hill Arena discussed above, a Mission Bay Sports and Entertainment Complex would benefit in terms of freeway access if new ramps proposed in Alternatives Three and Five are constructed. The same alternatives would, however, have the highest congestion levels along corridors such as Fourth Street and Fifth Street, and drivers would likely learn to use other routes, increasing congestion on the Embarcadero, Beale Street, and Eighth Street. Additional analysis, specific to the Mission Bay Sports and Entertainment Complex, would be completed if a specific proposal is made in the future.

Development Consistent with the Port's Waterfront Land Use Plan

In response to Proposition H, passed by the voters of San Francisco in 1990, the Port of San Francisco is developing a plan to guide future land use decisions along the waterfront. A draft of the plan, which was developed jointly by Port staff and a citizens advisory committee, is currently being analyzed for potential environmental effects, and a Draft EIR will be available for public review in the fall of 1995. Adoption and implementation of the Waterfront Land Use Plan would require approval of various public agencies including the Port Commission and the Bay Conservation and Development Commission. Legislative changes might also be required before certain aspects of the plan can be implemented.

Several alternative development scenarios consistent with the Draft Waterfront Plan are being analyzed in the EIR process.[23] One is the No Project Alternative, which assumes no waterfront plan, although some maritime and non-maritime development would continue to occur along the waterfront. (With several exceptions, projected development under the No Project Alternative could occur even if the Plan were adopted.) The second alternative being considered (Alternative A) assumes moderate development levels, with an emphasis on reuse of existing facilities and interim industrial/warehouse uses, and the third alternative (Alternative B) assumes maximum reasonable increases in maritime, commercial (retail, office/R&D, hotel) and assembly/entertainment/recreational uses. 2010 has been selected as the horizon year for these analyses, and no net increase in regional employment or population is projected as a result of implementation of the Plan.

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[22] Analysis by Korve Engineering, Inc., April 10, 1995 Draft Memorandum "Entertainment/Sports Center in Mission Bay."

[23] San Francisco Planning Department, 94.155E: Waterfront Land Use Plan, Notice that an Environmental Impact Report is Determined to be Required, November 29, 1994.

The 2015 future context assumed for the traffic analysis in this EIS/EIR is most similar to the Waterfront Plan EIR's No Project Alternative, because ABAG 92 (R) projections, distributed by zones, are the basis of both. With this similarity, the current analysis acknowledges that adoption of a Waterfront Land Use Plan may itself be reasonably foreseeable, but treats the slight redistribution of regional development projected to occur under Waterfront Plan Alternatives A and B as entirely speculative because the buildout assumed for analysis purposes would not be caused by the Plan, but would depend on more successful, individual development proposals than are cumulatively reasonably foreseeable at this time.

The development scenarios assumed in Alternative A and Alternative B were developed in order to analyze potential impacts of the draft plan, and would both add person trips to the base amount derived from ABAG's projections. Insofar as the additional trips under each scenario occurred by automobile in peak periods, results of the Mid-Embarcadero/TSS analysis contained in this EIS/EIR could be affected on certain corridors and at certain locations near the waterfront. In most cases, the Level of Service would likely remain the same during the peak hours, and would change in off-peak conditions (i.e. on the weekends) to more closely resemble peak conditions. In some cases, such as the intersections of Embarcadero/Bay, Embarcadero/Sansome, Embarcadero/Battery, and Embarcadero/Harrison, the development scenario which assumes the most commercial activity (Waterfront Plan EIR Alternative B) could cause the Level of Service to deteriorate from values projected in the current Md-Embarcadero/TSS analysis (B, C, or D for Alternative 3A, which has the highest overall volumes) to unacceptable levels (E or F). Level of service could also degrade under other roadway alternatives with lower volumes, but probably at fewer intersections. These possible occurrences are not assumed in the current Mid-Embarcadero/TSS analysis because they are based on projections of future development that are entirely speculative. The Waterfront Plan EIR will analyze effects associated with these projections.

Rezoning and Development on the Clay and Washington Freeway Parcels

As stated in Section 4.1.2, Senate Bill 181 (Kopp, 1991) provided that sites formerly occupied by the Embarcadero Freeway could be transferred to City ownership and sold, as long as the proceeds were used for replacement transportation facilities. Four parcels along Broadway, and two between Clay and Washington Streets have already been or are being transferred to City ownership. The Broadway parcels are zoned C-2 (Community Business), which would permit residential or commercial development. The Clay and Washington Parcels are zoned P (Public), and are currently used as public open space. (The Clay and Washington parcels are referred to elsewhere in this document as portions of Assessor's Block 202 and 203.) To fund the current project, the City's Chief Administrative Officer proposes to sell the Broadway parcels, and to rezone and then sell the Clay and Washington parcels. Rezoning of the Clay and Washington parcels is proposed in conjunction with an amendment to the Golden Gate Redevelopment Plan, and with specific development scenarios.

While rezoning and development on some or all of the Broadway and Clay/Washington parcels could be considered "reasonably foreseeable," the nature of that development is speculative, and potential future cumulative traffic increases related to future development on the Broadway and Clay/Washington parcels have been considered in the current analysis by assigning increases in employment to zones where the parcels are located. For example, existing, future, and net change in employment and households are shown below for zone 429, along with the net change (i.e. cumulative growth) assumed in the current analysis. (Zone 429, which is bounded by Market Street, Drumm Street, Sacramento Street, Battery Street, Jackson Street, Front Street, Broadway, and the Bay, contains the Clay/Washington parcels.)

Future Projections for Households and Employment

Traffic Analysis Zone (TAZ) 429

	Existing (1990)	2010	2015	1990 to 2015 Net Change
Employment	20,831	21,266	21,896	1,038
Households	1,170	1,219	1,231	61

Source: 1990 and 2010 figures are from ABAG (92 Revised); adjustment and 2015 by the San Francisco Planning Department.

Using conservative employment densities from the Mission Bay EIR (one per 276 sq. ft. office, and one per 350 sq. ft. retail), the 1990 to 2015 net change in employment would be equivalent to about 286,500 sq. ft. of office development, or about 250,000 sq. ft. office and 46,000 of retail development, or some other equivalent mix of commercial uses. Acknowledging that the ABAG 92 (R) projections used in the current traffic analysis (and therefore the air quality analysis) are higher than ABAG's Projections 94, this is a conservative (i.e. large) assumption regarding future employment growth, a great percentage of which could be assumed to occur on the Clay/Washington parcels because these parcels have the advantages of being large, mostly vacant, and already assembled.

The development program currently suggested by the CAO's Waterfront Transportation Projects Office for the Clay/Washington parcels would allow one of several development scenarios, with a maximum of 330,000 gross square feet of office space, 55,000 gross square feet of retail, and 100 parking spaces on Assessor's Block 203, and a maximum of 230,000 gross sq. ft. of mixed commercial (retail/office/recreational/cultural), 50,000 sq. ft. of community facilities, and 680 off-street parking spaces on a portion of Assessor's Block 202. Even though these development scenarios are maximum envelopes that will be used to analyze potential site-specific and development-specific impacts through a separate, future environmental analysis, a supplemental traffic analysis was performed because the size of these scenarios exceeds the future cumulative projections based on ABAG information, as described above.

The traffic analysis calculated intersection delay and level of service at ten intersections after adding the likely additional peak period trips to those assumed in the original TRAF-NETSIM traffic simulation analysis. The results for Alternative Three (the Second Street Option), which would have the highest overall traffic volumes of any alternative, demonstrate that the additional vehicle trips that would occur if the proposed development scenarios were implemented in place of assumed development levels, would increase delay by between one and 16 seconds at some nearby intersections in the AM and/or PM Peak Hour, and would decrease intersection LOS at four intersections: Battery/Broadway, Front/Broadway, Embarcadero/Washington, Embarcadero/Broadway. In one case, at Embarcadero/Broadway in the PM Peak, the additional trips would cause about six additional seconds of delay and would degrade the intersection LOS to an unacceptable level (from LOS B existing, LOS C under the No Build Alternative, and LOS D under Alternative Three -- Second Street Option, to LOS E). The additional trips might also degrade the Embarcadero/Broadway intersection in other alternatives where projected delays are 39 seconds (Alternative Three -- Fourth Street Option, Alternative Five -- Second and Fourth Street Options) and 34 seconds (Alternative Four).[24]

Cumulative Effects of Possible Future Projects

Singly and in combination, the projects described above would attract more people to the greater downtown of San Francisco (including the South of Market and Mission Bay areas). The increase in person trips would affect traffic conditions, congestion levels, and other transportation issues such as transit loading, transit delay, and parking demand, whether or not one of the Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure considered in this EIS/EIR is constructed. More intersections would deteriorate to less than acceptable levels of service than are currently projected to do so by 2015, and PM Peak Hour conditions would be experienced more of the time on local streets and regional freeways.

If the project analyzed in this EIS/EIR is implemented, realignment of the Mid-Embarcadero Roadway and implementation of the surface street improvements proposed in all build alternatives would facilitate traffic flow. With both the Second Street and Fourth Street Options of Alternatives Three and Five, drivers travelling inbound or outbound to/from the greater downtown would have more access points between the freeway and the local street system than currently exist. Drivers would also probably experience more congestion, particularly on the Fourth Street corridor, than with Alternatives Two and Four. On the whole, as described in Section Seven, Unavoidable Adverse Effects, cumulative future traffic conditions would be worse in terms of congestion, average speed, and the duration of "peak" conditions, with implementation of the possible future projects described here.

4.5.2 TRANSIT

The MTC Travel Model assumes that future transit services will be similar to those existing today, except that some planned transit projects will be constructed by 2010, and existing transit service will increase in proportion to the projected growth in transit travel demand that is not served by one of the planned projects. While this assumption may not be entirely valid in every instance where, for example, reduced demand may force a transit operator to make service reductions, it does seem valid in the broader, long-term view, in which decreases by one provider would tend to be compensated for by another's increases. This long-term view is particularly appropriate given San Francisco's "Transit First" policy, which indicates that the City has established transit as the preferred mode for satisfying growing travel demand. Transit improvements assumed for 2015 are based primarily on MTC projections for 2010.

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[24] Korve Engineering, Inc. April 5, 1995 Draft Memorandum, "Reassessment of Future Land Uses for TAZ 429."

Based on the MTC travel model, transit travel demand to the primary study area is projected to increase between 27.0 and 30.8 percent over 1993 levels by 2015, depending on the alternative selected. In the combined primary and secondary study area, the increase would be between 24.0 and 26.6 percent. Much of this increased demand would be served by planned transit services. Briefly, these new services include:

- MUNI Metro extension south of Mission Bay to Sixteenth Street.

- The F-Market (F-Line) electric streetcar extension to Fisherman's Wharf along the median of the Embarcadero roadway. The service would also operate during the entire year.

- BART service on the Daly City line extended to the San Francisco International Airport and service headways through San Francisco improved from the existing 3.75 minutes to 2.25 minutes. BART extensions to Pittsburgh/Antioch and Dublin/Pleasanton in the East Bay are also assumed to be in place by 2015 (these extensions are currently under construction).

- PCS (CalTrain) service extension to downtown San Francisco, and service level increases from the existing 60 daily trains to between 86 and 114 trains.

In addition to the planned transit service changes described above, which are assumed to be in place regardless of the project alternative selected, there are other transit-related changes that are assumed to occur. Assumed transit-related changes are described below for each operator.

San Francisco Municipal Railway (MUNI)

A number of service alterations and extensions are planned by MUNI to be in service by 2015. MUNI Metro is assumed to be extended south of Mission Bay to 16th Street. This extension is planned to be served by the existing N-Judah MUNI Metro line as discussed in MUNI's 1992-2001 Short-Range Transit Plan. With this extension, changes would be made to the existing

CalTrain express buses (80X, 81X, and 82X). Route 80X would be canceled and Routes 81X and 82X would be realigned.

The F-Market electric streetcar, which currently operates along Market Street during the summer, is planned to be extended to Fisherman's Wharf along The Embarcadero. The service would operate during the entire year with the extension. MUNI's existing Routes 8 and 32 would be canceled after the F-Line extension is in place.

MUNI also has plans to expand the size of the bus layover facility at Mission and Steuart to meet future operational needs. The planned expansion would occupy portions of the existing Embarcadero roadway; and the build alternatives proposed by the City would accommodate this expansion.

Golden Gate Bridge, Highway and Transportation District (GGBHTD)

The only change assumed for GGBHTD, with one exception, is an increase of existing services to accommodate projected growth in travel demand. The single exception is the possible cancellation of Route 67, which currently provides shuttle service between the Ferry Building and the San Francisco Civic Center. Similar service would be provided by the MUNI F-Line extension described above and Route 67 could be eliminated as a result.

In consultation with GGBHTD staff, it was assumed in this study that GGBHTD ferry services will increase from the current 23 daily round trips between San Francisco and Larkspur/Sausalito to 29 daily round trips to accommodate future growth in travel demand.

San Mateo County Transit District (SamTrans)

SamTrans bus service to San Francisco is assumed to reflect the increased reliance on rail service that would result from the extension of BART to the San Francisco Airport and the extension of CalTrain to downtown San Francisco. With the two rail extensions expected to provide sufficient capacity to handle the growth in travel between the Peninsula and San Francisco, SamTrans bus service is assumed to remain at existing levels.

This assumption for SamTrans service is likely to represent a maximum service level scenario. With the extension of BART and CalTrain, some SamTrans routes could be reduced. For instance, in the BART-SFO Alternative Analysis completed in March 1992, it was assumed that SamTrans Routes 19F, 41F, and 48F would no longer serve downtown San Francisco if BART were to be extended to the San Francisco Airport.

Bay Area Rapid Transit District (BART)

Some major changes are planned by BART by 2015. Service is planned to be extended to the San Francisco International Airport and service headways through San Francisco would be improved from the existing 3.75 minutes to 2.25 minutes, a 67 percent increase in service. This extension would serve San Francisco and East Bay residents traveling to the Airport or northern San Mateo County, as well as Peninsula residents traveling to San Francisco or the East Bay.

BART is also constructing two extensions in the East Bay; the Pittsburg/ Antioch extension and the Dublin/Pleasanton extension. These two extensions will be in operation in 2015, with interim service beginning in 1996.

Alameda - Contra Costa County Transit (AC Transit)

AC Transit service is assumed to increase in response to growth in travel demand from the East Bay. While the BART extensions and service increases described above will likely capture a large share of this growth in travel, AC Transit service is expected to increase as well.

Other Transit Services

Other transit services reviewed for this project include the Peninsula Commute Service (PCS or CalTrain), ferry services to the Ferry Building, Greyhound Bus, Airporter Buses, Amtrak feeder buses, Gray Line tour buses, and other smaller tour bus lines operated from the Transbay Terminal.

CalTrain service is assumed to be extended about 1-1/2 miles from its current terminus at Fourth and Townsend Streets to downtown San Francisco (near Market Street). Various locations for this downtown station are being considered, including a Beale Street location currently favored by the City and the CalTrain Joint Powers Board. Service levels would also improve to accommodate the increased ridership expected from the extension. Previous studies have indicated that CalTrain service would increase to between 86 and 114 daily trains, compared to 60 daily trains operated today.

Ferry services to the Ferry Building (except for GGBHTD services which are discussed above) are also projected to increase by 2015. The Tiburon Ferry is assumed to operate two additional trips each day, for a total of nine daily round trips. The Vallejo, Alameda, and Harbor Bay ferry services are assumed to add a combined total of six additional round trips each day, for a combined total of 25 daily round trips for the three services.

Other transit services in the study area such as the Airporter, Amtrak feeder buses, Gray Line, and other private bus operators are assumed to offer services similar to those provided today, with possible service increases in response to demand.

Transit Operations

San Francisco Municipal Railway (MUNI)

Transit Vehicle Circulation. Street modifications and traffic operational changes proposed under each of the project alternatives would not alter any of the MUNI routes serving the study areas. The only changes to roadway circulation within the study area are described below.

- The U-turn currently allowed from the northbound Embarcadero to the southbound Embarcadero just north of Washington Street would be eliminated in all build alternatives.
- Harrison Street would be converted to a one-way street westbound between First and Third Streets. Left turns from the northbound Embarcadero to Harrison Street would be prohibited.
- Essex Street would be converted to a one-way street southbound in Alternatives Three and Five.
- Transit lanes would be provided on First and Fremont Streets in all build alternatives.

- Davis Street would be reopened to traffic between Clay and Washington Streets in Alternatives Three and Five.

None of these changes would affect current MUNI bus routing, and none would therefore affect transit vehicle circulation. The only change to bus routes anticipated would be the possible extension of the 83-Pacific route several blocks to connect with the F-Line on The Embarcadero. This change would be considered by MUNI staff and would require approval of the City's Public Transportation Commission.

Transit Vehicle Delay. Delaying of transit vehicles might occur wherever changed traffic volumes or roadway circulation patterns would create new traffic congestion locations. Increases in delay can result in extra costs or inconveniences to passengers. Table 4.5-13 shows area-wide bus delay statistics generated by the TRAF-NETSIM traffic simulation model for the primary study area. Pre-earthquake, existing (1993), and 2015 Alternatives One through Five are shown.

Compared to the pre-earthquake and existing conditions, AM peak conditions are projected to be slightly worse with delay increasing from 6.5 minute per bus in the pre-earthquake period and 6.2 minutes for the existing condition, to between 6.4 and 6.6 minutes for the 2015 build alternatives. All build alternatives, however, show improvement over the No Build Alternative (6.6 minutes delay per vehicle for the No Build Alternative compared with 6.4 to 6.5 minutes for the build alternatives).

For the PM peak, under normal (non-incident) conditions, all build alternatives are projected to show improvement over the pre-earthquake, existing and 2015 Alternative One (No-Build) conditions. Delay is measured at 9.7 minutes per vehicle for pre-earthquake, 7.2 minutes per vehicle for the existing condition, and 6.8 minutes per vehicle for the 2015 No Build scenario. This compares to a delay per vehicle of 6.6 to 6.8 minutes for the various build alternatives.

Table 4.5-14 shows the predicted changes to travel times on selected MUNI routes within the downtown primary study area. The bus routes exhibited were selected to be representative of the various alignments currently used by MUNI routes through the downtown primary study area. Values shown are changes in delay compared to the pre-earthquake condition. Travel time increases (of three minutes or more) are shown as shaded areas. Comparisons can also be made between each alternative and existing conditions.

TABLE 4.5-13
AVERAGE PER BUS DELAY
IN MINUTES PER VEHICLE
OVERALL AVERAGE FOR THE PRIMARY STUDY AREA

	AVERAGE DELAY (MINUTES PER BUS)	
ALTERNATIVE	**AM PEAK**	**PM PEAK**
Pre-Earthquake	6.5	9.7
Existing	6.2	7.2
1	6.6	6.8
2	6.5	6.6
3a	6.5	6.6
3b	6.4	6.7
4	6.5	6.8
5a	6.5	6.6
5b	6.4	6.7

Source: Korve Engineering, July 1994

TABLE 4.5-14
CHANGE IN TRANSIT TRAVEL TIME COMPARED TO PRE-EARTHQUAKE CONDITIONS
MUNI ROUTES IN THE PRIMARY STUDY AREA
FOR THE YEAR 2015
(minutes)

			ALTERNATIVE									
ROUTE	PEAK PERIOD	DIRECTION	PRE-EARTH	EXISTING	1	2	3A	3B	4	5A	5B
1	AM	IB	–	-2.9	-2.4	-2.3	-2.2	-2.4	-2.3	-2.2	-2.4
		OB	–	-4.2	-2.4	-2.3	-2.0	-2.4	-2.2	-2.0	-2.4
	PM	IB	–	-0.7	2.4	2.4	2.4	2.4	2.4	2.4	2.4
		OB	–	0.1	2.9	▨ 3.1	2.9	2.9	2.9	2.9	2.9
1AX	AM	IB	–	1.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		OB	–	–	–	–	–	–	–	–	–
	PM	IB	–	–	–	–	–	–	–	–	–
		OB	–	-0.1	1.7	1.9	1.9	1.9	1.9	1.9	1.9
2	AM	IB	–	0	0.0	0.3	0.4	0.1	0.2	-0.8	-0.8
		OB	–	-0.3	-0.1	-0.2	-0.0	-0.5	-0.2	-0.3	-0.3
	PM	IB	–	0	-0.8	0.2	0.7	0.2	-0.8	-0.8	1.2
		OB	–	0	-0.3	-0.3	-0.2	-0.9	-0.3	-0.3	-0.5
12	AM	IB	–	-0.4	-0.8	-0.1	1.1	-0.8	-0.8	1.1	-0.8
		OB	–	-1	-0.3	-1.1	0.7	-0.3	-0.3	0.7	-0.3
	PM	IB	–	-4.3	-2.9	-3.2	-0.8	-1.9	-0.5	-0.8	-1.9
		OB	–	-1.3	-0.7	0.3	-0.3	1.9	▨ 3.4	-0.3	1.9
14	AM	IB	–	0.6	-0.8	0.6	0.2	0.5	1.0	0.2	0.5
		OB	–	-0.5	-0.3	-0.5	-0.9	0.2	-0.2	-0.3	0.2
	PM	IB	–	0.2	-0.0	1.2	1.0	0.8	0.9	1.0	0.8
		OB	–	0	-0.3	-2.1	-3.3	-3.2	-0.1	-3.3	-3.2
14X	AM	IB	–	-0.8	0.3	0.3	-0.1	0.2	0.7	0.3	0.2
		OB	–	–	–	–	–	–	–	–	–
	PM	IB	–	–	–	–	–	–	–	–	–
		OB	–	-0.8	1.9	-1.9	-3.4	-4.7	-1.9	-3.4	-4.7
15	AM	NB	–	-0.8	-0.8	-1.3	-2.6	-1.9	-1.4	-2.6	-1.9
		SB	–	1.2	-0.3	0.6	2.5	1.9	1.6	2.5	1.9
	PM	NB	–	-0.8	-0.8	-1.4	-1.9	-1.7	-1.2	-1.9	-1.7
		SB	–	-0.8	-0.3	1.0	1.9	2.2	▨ 4.7	1.9	2.2
27	AM	NB	–	-0.8	-0.8	0.2	-1.2	-0.8	-0.8	-1.2	-0.9
		SB	–	-0.8	-0.3	-0.9	0.3	-0.3	-0.3	0.3	0.3
	PM	NB	–	0.6	-0.8	0.8	0.5	0.3	0.2	0.5	0.3
		SB	–	-0.5	-0.3	0.5	0.2	0.2	-0.9	0.2	0.2
30X	AM	IB	–	1.2	-0.2	0.3	1.7	0.2	-0.9	1.7	0.2
		OB	–	–	–	–	–	–	–	–	–
	PM	IB	–	–	–	–	–	–	–	–	–
		OB	–	-3.1	-1.6	-0.9	-1.9	-1.4	-1.4	-1.6	-1.4
41	AM	IB	–	-2.9	-2.5	-2.3	-2.5	-2.5	-2.3	-2.8	-2.5
		OB	–	-4.3	-2.4	-1.6	-2.4	-2.4	-1.0	-2.1	-2.4
	PM	IB	–	-1.1	1.8	1.8	2.4	▨ 3.3	-0.8	2.4	▨ 3.3
		OB	–	-0.4	2.4	2.4	2.0	2.2	-0.3	2.9	2.2
42	AM	CW	–	-0.8	1.0	0.8	-1.3	-1.4	-1.6	-1.3	-1.4
		CCW	–	-0.8	2.4	1.4	0.1	1.0	1.6	-0.1	0.8
	PM	CW	–	-1.5	2.9	2.9	▨ 4.2	▨ 5.2	2.9	▨ 4.2	▨ 5.2
		CCW	–	-4.2	0.2	0.2	1.2	-0.1	1.5	1.2	-0.1
45	PM	NB	–	-0.8	-0.8	-1.3	-2.6	-1.9	-1.4	-2.6	-1.9
		SB	–	-0.8	-0.3	0.1	2.5	1.4	0.2	2.5	1.4
	PM	NB	–	-0.8	-0.8	0.3	0.2	-0.0	0.5	0.8	-0.0
		SB	–	-0.8	-0.3	-2.4	-0.5	0.1	-2.8	0.5	0.1
81X	AM	IB	–	1	0.3	0.3	0.3	-0.2	-0.9	-0.9	-0.2
		OB	–	–	–	–	–	–	–	–	–
	PM	IB	–	–	–	–	–	–	–	–	–
		OB	–	-0.2	2.6	2.3	2.0	▨ 3.2	▨ 6.3	-0.9	▨ 3.2
82X	AM	NB	–	-0.8	0.7	0.3	0.3	0.3	0.3	0.3	0.3
		SB	–	–	–	–	–	–	–	–	–
	PM	NB	–	–	–	–	–	–	–	–	–
		SB	–	-1.6	1.5	1.8	2.2	2.7	1.9	2.2	2.7
CALIF CABLE CAR	AM	IB	–	0.3	0.6	0.6	0.4	0.7	0.7	0.4	0.7
		OB	–	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	PM	IB	–	0	0.3	0.3	-0.2	-0.0	-0.3	-0.2	-0.0
		OB	–	-0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2

IB =	Inbound	SB =	Southbound	CW =	Clockwise
OB =	Outbound	NB =	Northbound	CCW =	Counterclockwise

▨ = Travel time increases of 3 minutes or more

Source: Korve Engineering, Traffic Analysis Results, July 1994

Tables 4.5-15 and 4.5-16 show changes to bus travel times on selected streets. These two tables highlight some locations affected by the project alternatives and illustrate where much of the delay shown on Table 4.5-14 would occur. Shaded values indicate areas where bus travel times would increase by 10 percent or more. A column showing buses per hour also appears, an indication of the importance of each street segment in terms of how much bus service is affected.

As shown on Table 4.5-14, many of the bus routes would experience faster travel times compared to the pre-earthquake condition. Other bus routes would find little or no change. Route 1 in the AM peak is predicted to experience reductions in travel time of over 2 minutes for either direction of travel. Likewise, Route 15 would have shorter travel times on the order of 2-3 minutes in the AM peak.

When compared to pre-earthquake existing conditions, increases in travel time are predicted on several routes under the No Build Alternative. Route 42, for instance, shows increases in travel time for the PM peak for the clockwise trips. The largest increases are for Alternatives Three and Five, where travel time is projected to increase by 4.2 to 5.2 minutes. Table 4.5-16 indicates where some of this Route 42 delay would occur. The table shows that First Street between Market and Harrison Streets would experience increases in travel time of about one minute in Alternatives Three and Five, so this one street segment accounts for 20 to 25 percent of the increase in travel time associated with Route 42.

From the data shown on Tables 4.5-15 and 4.5-16, it appears that the streets with the greatest potential for increased delay are as follows: in the AM peak, eastbound Mission Street between Sixth and Steuart Streets would experience increased delays of up to 2 minutes compared to pre-earthquake conditions, and eastbound Folsom Street between Sixth and Second Streets would experience additional delay of about one minute; in the PM peak, northbound Main Street between Market and Howard Streets shows increased travel times of 30 seconds to one minute, southbound First Street between Market and Harrison Streets shows increased travel times of about one minute, northbound Third Street between Market and Brannan Streets shows increases of about 1-1/2 minutes, southbound Fourth Street shows increases of 2 to 4 minutes, eastbound Mission Street increases of about 1-1/2 minutes, and eastbound Folsom Street increases of 1 to 3 minutes. Many of these increased travel times, however, would occur with or without the proposed project.

TABLE 4.5-15
TRANSIT TOTAL TRAVEL TIME PER VEHICLE
UNMITIGATED CONDITIONS
AM PEAK HOUR

STREET SEGEMENT	BUSES PER HOUR	TOTAL TRANSIT TRAVEL TIME (seconds/bus)								
		PRE QUAKE	1993 EXIST	2015						
				Alt 1	Alt 2	Alt 3A	Alt 3B	Alt 4	Alt 5A	Alt 5B
Main St. NB										
(Howard to Market)	15	177	87	87	83	87	85	101	87	85
Fremont St. NB										
(Folsom to Transbay Term.	1	60	54	**68**	**67**	**77**	**70**	**72**	**77**	**70**
(Transbay Term. to Market)	20	48	41	38	36	37	41	41	37	41
Sansome St. NB										
(Bush to Pacific)	7	229	219	194	240	209	217	243	209	217
Battery St. SB										
(Broadway to Market)	48	203	213	**235**	219	223	**237**	205	223	**237**
First St. SB										
(Market to TBT)	64	43	**55**	**66**	**59**	**62**	**57**	**59**	**62**	**57**
(TBT to Harrison)	16	67	58	50	62	73	66	**80**	73	66
Third St. NB										
(Brannan to Market)	35	304	289	**378**	332	292	313	327	292	313
Fourth St. SB										
(Market to Brannan)	25	332	323	323	327	**378**	359	323	**378**	359
Broadway EB										
(Montgomery to Battery)	7	135	60	59	64	61	61	64	67	61
Market St. EB										
(6th to New Montgomery)	59	238	240	235	229	233	234	234	233	234
(New Mont. to Steuart)	83	180	180	177	181	184	175	175	184	175
Market St. WB										
(6th to New Montgomery)	59	309	311	305	305	303	307	302	303	307
(New Mont. to Steuart)	83	196	197	193	191	194	181	190	194	181
Mission St. EB										
(6th to Steuart)	26	358	386	**466**	**470**	**454**	**460**	**453**	**454**	**460**
Folsom St. EB										
(6th to 2nd)	27	214	201	**267**	**268**	**275**	**274**	217	**275**	**274**

▨ = Travel time increases of 10 percent or more compared to pre-earthquake conditions

Source: Korve Engineering, Traffic Analysis Results, July 1994

TABLE 4.5-16
TOTAL TRANSIT TRAVEL TIME PER VEHICLE
UNMITIGATED CONDITIONS
PM PEAK HOUR

STREET SEGEMENT	BUSES PER HOUR	TOTAL TRANSIT TRAVEL TIME (seconds/bus)								
		PRE QUAKE	1993 EXIST	2015						
				Alt 1	Alt 2	Alt 3A	Alt 3B	Alt 4	Alt 5A	Alt 5B
Main St. NB										
(Howard to Market)	22	72	69	**111**	**99**	**92**	**96**	**100**	**92**	**96**
Fremont St. NB										
(Folsom to Transbay Term.)	6	60	**80**	65	**67**	**111**	65	**111**	**111**	65
(Transbay Term. to Market)	53	55	46	47	41	42	44	43	42	44
Sansome St. NB										
(Bush to Pacific)	40	209	142	163	165	165	151	157	156	151
Battery St. SB										
(Broadway to Market)	12	293	256	240	240	250	273	240	250	273
First St. SB										
(Market to TBT)	34	59	60	63	59	64	64	61	64	64
(TBT to Harrison)	10	98	104	**110**	**116**	**154**	**158**	**111**	**154**	**158**
Third St. NB										
(Brannan to Market)	19	221	**318**	**309**	**308**	**307**	**299**	**314**	**307**	**299**
Fourth St. SB										
(Market to Brannan)	15	294	**383**	**551**	**470**	**528**	**545**	**458**	**528**	**545**
Broadway EB										
(Montgomery to Battery)	12	85	51	53	50	53	50	52	53	52
Market St. EB										
(6th to New Montgomery)	70	260	234	244	250	245	243	242	245	243
(New Mont. to Steuart)	103	189	170	177	173	189	205	184	189	205
Market St. WB										
(6th to New Montgomery)	70	300	269	281	278	278	279	274	278	279
(New Mont. to Steuart)	103	279	251	262	258	258	252	272	258	252
Mission St. EB										
(6th to Steuart)	13	309	**405**	**432**	**437**	**431**	**427**	**427**	**431**	**427**
Folsom St. EB										
(6th to 2nd)	14	100	**164**	**223**	**213**	**217**	**317**	**219**	**217**	**317**

▨ = Travel time increases of 10 percent or more compared to pre-earthquake conditions

Source: Korve Engineering, Traffic Analysis Results, July 1994

It should be noted that many of the increases in travel time are associated with increased traffic volumes on local streets that would occur whether or not a Mid-Embarcadero/TSS Replacement alternative is implemented. This is seen by comparing the Alternative One (No-Build) travel time changes with those of the build alternatives. In many cases, the delay shown for the No-Build Alternative in 2015 is equivalent to, or even greater than, that shown for the build alternative. The implication of this is that implementing improvements to The Embarcadero would not, in its own right, cause much of the increases in travel time being shown.

Where travel time increases can be attributed to one or more of the build alternatives it appears that, in many cases, this would be due to the new freeway ramps. This is believed to be the reason for some of the travel time increases noted for First Street in the PM peak, under Alternatives Three and Five, when traffic would use First Street to access I-80 ramps on Harrison Street. MUNI Routes 15 and 42 would be most affected by such congestion on First Street.

For the secondary study area, there do not appear to be any project-created delays of consequence at the intersections reviewed. However, some of these intersections would experience increased delay due to growth in travel volumes projected for 2015. Table 4.5-3 shows LOS values for these intersections for the 2015 AM and PM peaks. In the AM peak, the following intersections would experience increased delay as indicated by a slight worsening of the LOS: Bay and Embarcadero (used by Routes 42 and 82X) delay per vehicle would increase by about 15 seconds compared to 1993 conditions, Sansome and Embarcadero (used by Routes 42 and 82X) delay would increase by about 12 seconds, Broadway and Stockton (used by Routes 9X, 9AX, 9BX, 12, 30, 30X, 45, and 83) delay would increase by about 18 seconds, California and Kearny (used by Routes 9X, 15, and the California Cable Car) delay would increase by about 4 seconds, Townsend and Third (used by Routes 15, 30, 42, 45, 76, 80X, 81X, and 82X) delay would increase by about 20 seconds, and O'Farrell and Stockton (used by Routes 9X, 30, 38, 38L, and 45) delay would increase by about 6 seconds.

In the PM peak, the following secondary study area intersections would experience increased delay: Bay and The Embarcadero (used by Routes 42 and 82X) delay would increase by about 18 seconds per vehicle compared to 1993 conditions, Sansome and The Embarcadero (used by Routes 42 and 82X) delay would increase by about 20 seconds, Townsend and Third (used by Routes 15, 30, 42, 45, 76, 80X, 81X, and 82X) delay would increase by 20 seconds, Bush and Powell (used by Routes 1AX, 1BX, 31AX, 31BX, 38AX, 38BX, and the Powell-Hyde and Powell-Mason Cable Cars) delay would increase by about 7 seconds, Ellis and C. Magnin (used by Route 27) delay would increase by about 3 seconds, and O'Farrell and Stockton (used by Routes 9X, 30, 38, 38L, and 45) delay would increase by about 4 seconds.

As shown on Tables 4.5-13 through 4.5-16, MUNI bus routes would experience delay in certain specific locations within the downtown primary study area as a result of implementing one of the project build alternatives, but for the entire primary study area, average per-vehicle bus route delay would decrease (i.e. the sum of all bus travel times within the primary study area would decrease). Some routes would experience a net increase in per-vehicle travel time, possibly requiring additional vehicles, while other routes would experience travel time decreases and possible reductions in vehicle requirements. In general, it is highly probable that transit vehicle requirements would not increase as a result of delays projected under any of the build alternatives. Extension of the 83-Pacific bus route would require one additional peak period vehicle, and an increase in annual operating costs. (See socioeconomic impacts discussion, page 368.) The final determination regarding whether projected delays would require additional vehicles would depend on details of scheduling, including layover time and route interlining (use of the same transit vehicle on connecting routes).

Given constraints of the NETSIM traffic simulation model, which cannot replicate full signal priority for light rail vehicles, this analysis used a traffic signal progression system to model future traffic and transit conditions on The Embarcadero in 2015. The MUNI Metro light-rail extension will surface just north of Folsom in The Embarcadero median and then immediately cross Folsom. Operating plans calls for signal preemption at this location, which would avoid delays to the line. The plans for the F-Line light-rail extension include full signal preemption at all intersections along The Embarcadero, as stated in the Embarcadero surface roadway Environmental Assessment in November 1990. Providing the F-Line with signal preemption would avoid any impacts to F-Line operations. A preliminary analysis showed that full preemption would have no adverse effect on automobile traffic except at the intersection of The Embarcadero and Washington Street, and the intersection of The Embarcadero and Broadway, where full preemption could cause delays to automobiles in future year 2015. Further analysis is required to determine if the plan to install full preemption at these intersections should be reevaluated.

Transit Vehicle Delay Under Incident Conditions. A separate series of TRAF-NETSIM runs were conducted to assess PM Peak surface street traffic conditions under incident conditions (such as an accident or stall on the eastbound Bay Bridge), which are estimated to occur in 25% to

30% of weekday peak periods under existing conditions. The results provide an indication of the additional delay that would be experienced by transit vehicles during such incidents as they travel along access routes to the bridge.

The analysis indicates that when an incident occurs, traffic queue lengths and per-vehicle delay would increase dramatically at key intersections on travel routes to the Bridge. Table 4.5-7 and Figures 4.5-11 through 4.5-13 in Section 4.5.1 present the results of the incident analysis. Key intersections representing all the primary routes to the Bridge were reviewed. Table 4.5-17 shows the changes to per-vehicle delay at these intersections.

In general, transit vehicles may experience delay effects somewhat less that shown for locations presented on Table 4.5-17 if they can bypass the automobile queues waiting to access the Bridge. For instance, the build alternatives provide for a peak-period transit-only lane on First Street between Howard and Harrison Streets which would allow MUNI Route 42 to bypass much of the traffic queues which form on this street. Likewise, queues on Second and Third Streets are largely a result of automobiles making left or right turns to access a freeway on-ramp, and through buses would only be partially affected by these queues. Nevertheless, Table 4.5-17 provides an indication as to the magnitude of the delay's effect that would be caused by incidents on the Bay Bridge.

Several conclusions can be drawn from the data shown on Table 4.5-17. First, most locations show increases in delay during incident conditions regardless of the alternative. There are some exceptions, however, such as the intersections of Second and Harrison Streets or Third and Bryant Streets where Alternatives Three, Four and Five (all of which provide new ramps to I-80) provide much better results than Alternatives One (No Build) or Two.

Second, the amount of delay created by incidents would range between one and five minutes per vehicle, and would have the potential to increase transit vehicle travel times by a corresponding amount. For instance, delay at Harrison and First Streets would increase by 160 to 210 seconds (2.5 to 3.5 minutes) per vehicle, at Folsom and First Streets by 165 to 200 seconds (2.5 to 3.5 minutes), at Battery and Bush Streets by 140 to 160 seconds (2 to 2.5 minutes) and at Second and Harrison Streets by 200 to 250 seconds (3.5 to 4 minutes) in Alternatives One (No Build) and Two (at these locations, no delays are predicted for Alternatives Three, Four, and Five). This implies the cumulative delay as transit vehicles pass through multiple intersections could easily approach 10 to 15 minutes if they travel in mixed flow traffic.

TABLE 4.5-17

SIGNALIZED INTERSECTION TRANSIT DELAY (SEC / VEH)

INCIDENT CONDITIONS

PM Peak Hour (2015)

Intersection	Alternative 1		Alternative 2		Alternative 3-5		Muni Routes
	Non-Incident	Incident	Non-Incident	Incident	Non-Incident	Incident	
Harrison / First	9	208	9	221	8-15	177	42
Harrison / Spear	8	100	9	88	8	95	80X, 81X, 82X
Folsom / First	8	198	8	175	7	210	12, 42
Howard / First	12	91	12	101	18-22	102	12, 15, 42
Mission / First	9	185	8	148	7-10	165	5,6,12,14L, 15,38,38L, 42
Market / Battery	11	42	12	24	11-12	22	2,7,8,9,15,21,30X,31,42,66,71,81X
Sansome / Bush	13	88	8	133	8	141	1AX,18X,2,3,4,12,15,30X,31AX, 31BAX,38AX,38BX,
Battery / Bush	66	203	64	220	65-72	229	12,15,30X,42
Second / Harrson	28	221	30	278	6-7	6	15
Third / Bryant	7	81	7	83	7	36	30,45

Source: Korve Engineering, Incident Analysis, December 30, 1994

Third, the greatest amount of delay would be experienced by only a limited number of routes. Those routes which travel along freeway access routes (Such as Route 42 which operates on First Street) would experience traffic congestion along longer stretches of their alignment. Routes which merely cross freeway access routes (such as Route 2 which operates on Post, Sutter and Market Streets) would experience delay at fewer locations and therefore would not have as large an increase in total travel time. Routes 15 and 42 would probably experience the greatest delay under incident conditions. Routes on Mission Street (e.g. Route 14) and those accessing the Transbay Terminal from north of Market Street (e.g. Routes 38 and 38L) would experience somewhat less delay and routes entirely on or north of Market Street (e.g. Route 2) would experience the least delay.

Transit Patron Access and Transit Vehicle Loading. Transit access in the study area would be improved by 2015 because of construction of both the F-Line and MUNI Metro Extension light rail projects. All build alternatives would further improve transit access by expanding sidewalks and other pedestrian facilities along The Embarcadero, and by providing dedicated pick-up/drop-off zones in the vicinity of the Ferry Building. (See Section 4.5.5 for a discussion of pedestrian issues.)

Under existing conditions, bus loading occurs at the curb immediately in front of the Ferry Building, in the parking areas in front of the Ferry Building, and in adjacent areas such as the Pier 1/2 parking area. Automobiles (private automobiles and taxis) currently pick-up and drop-off passengers at the curb, in the parking areas in front of the Ferry Building, and in a wide range of locations in the general vicinity, including locations across the Embarcadero and some distance from the Ferry Building (at the Hyatt Regency Hotel at Market and Drumm Streets, for example). The same loading conditions existed prior to the earthquake, except that Amtrak buses, which currently load at the Ferry Building, departed from the Transbay Terminal instead.

In the future, the number of transit buses loading in the vicinity of the Ferry Building is projected to decrease below existing levels due to inauguration of MUNI F-Line service in the Embarcadero roadway median and elimination of MUNI's route 32 bus. At the same time, the amount of potential loading space around the Ferry Building is also projected to decrease (with the elimination of the Pier 1/2 parking area associated with the Downtown Ferry Terminal Project, for example). Future demand is projected to require two dedicated spaces for Amtrak buses, and two to three spaces to be shared by Golden Gate Transit and MUNI.[25] These shared spaces would be required in order to accommodate Golden Gate Route 69 and MUNI Route 82X, and could also accommodate Golden Gate Route 61 (mid-day, Christmas season only), and Golden Gate Route 67 if that route remains in service following inauguration of MUNI F-Line service (which is unknown).

Based on MTC's projections of peak period future ferry ridership for year 2000, and mode split information contained in the Port's Downtown Ferry Terminal Project Conceptual Design Report, about four percent of 6,645 peak period ferry passengers (about 270 people) would complete their trip in San Francisco by being picked-up or dropped-off by private automobile or taxi. The projection of over 6,000 peak period ferry passengers, more than double the 1994 peak period ridership of 2,650, is extremely optimistic for the year 2000, and exceeds substantially the estimate arrived at through consultations with ferry operators who predict a 29 percent increase in the number of daily ferry trips by 2015.[26]

There is insufficient data available (regarding shared trips and the location of trip origins/destinations) to determine the percentage of the estimated 270 peak period ferry passengers (an average of 108 per hour) being picked-up or dropped-off by automobile who would meet their rides at the Ferry Building versus other locations in the vicinity. Likewise, upon arrival of a ferry with a 400-person capacity, it is impossible to predict where the projected 16 passengers (4% of 400) who would be picked-up by private automobile or taxi would meet their rides. Uses within the Ferry Building, including potential new uses proposed as part of current rehabilitation and reuse alternatives, would also generate a demand for automobile and taxi loading in the vicinity, and for (generally off-peak) loading and unloading of service vehicles. Again, it would be speculative to estimate the percentage of peak period passenger loading demand that would be met at the Ferry Building versus other locations in the vicinity.

As currently designed, all build alternatives would provide two 200-foot long and 12 to 15-foot wide loading bays in front of the Ferry Building. In general, the 200-foot bays could each accommodate about three standard size busses or about 10 automobiles. If bus loading and automobile loading functions are separated, as dictated by operational efficiency, these bays would be insufficient to accommodate the future demand for transit bus loading, unless Amtrak buses or Golden Gate Transit busses were loaded somewhere else in the vicinity such as the Ferry Plaza behind the Ferry Building. Three bays would also not accommodate the charter buses or tour buses that might stop at the Ferry Building during peak periods in the future.

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[25] While Amtrak has stated a need for four spaces in the future, it seems reasonable to assume no expansion in service (and therefore two spaces) in light of funding cuts anticipated at the Federal level.

[26] Parsons Brinckerhoff Quade and Douglas. Conversations with staff of Golden Gate Bridge Highway and Transportation District, Blue and Gold Fleet, Red and White Fleet, and Harbor Bay Maritime, (April/May, 1993). This estimate also exceeds those provided in MTC's Draft 1994 Regional Transportation Plan EIR, Section 2.1, which projects between 3,600 and 4,400 average daily weekday boardings by 2010.

The deficiency of transit bus loading space would affect traffic circulation along the northbound lanes of the Embarcadero if busses were to stop along the curb during peak periods. At those times, the curb lane would be used for automobile traffic and bicycles, and busses stopped at the curb or projecting past the curb would reduce the capacity of the northbound roadway, potentially creating congestion and safety problems. To address the deficiency of transit bus loading space and to mitigate the potential impact on traffic circulation, the City would implement one of several mitigation options. (See mitigation discussion, p. 339-340.)

No deficiency of automobile loading space (i.e. space for pick-ups and drop-offs) has been identified, since the percentage of future demand that would be met directly in front of the Ferry Building instead of at other locations in the immediate vicinity is undetermined. Nonetheless, it is likely that additional automobile loading space would be needed in the vicinity as demand associated with ferry ridership and the rehabilitation and reuse of the Ferry Building increases. It is also anticipated that the Port of San Francisco will have to take reasonable efforts to manage loading activities in the vicinity of the Ferry Building, regardless of whether the current project is implemented.

In addition to the transit loading changes at the Ferry Building, all build alternatives would include the following three minor changes to transit-related facilities:

- A traffic lane would be added to First Street between Howard and Harrison Streets during peak periods. The existing left-side transit lane between Market and Mission Streets would become "moveable", shifting to curbside during the peak (7-9 AM and 3-6 PM) to provide an additional traffic lane, and shifting one lane to the right during the off-peak (9 AM - 3 PM) to allow a curbside metered loading zone. Electronic message signs and pavement markings would delineate the transit lines. The existing bus stop island on First Street at the Transbay Terminal would be shifted slightly south and east to provide room for this transit lane.

- A right-side, peak period-only transit lane would be provided on First Street between Market and Howard Streets. Pavement markings would delineate this transit lane, which would be shared by automobiles making right turns at Mission Street.

- The left-side transit lane on Fremont Street between Market and Mission would be moved to the left-side curb lane for the half-block closest to Market Street. The existing transit island at Fremont and Market Streets would also be moved one lane to the left.

Future increases in travel demand to 2015 are expected to result in comparable increases in transit service under the No Build Alternative. Alternatives Two and Four would have the same number of transit riders to or from downtown as the No Build Alternative, and transit vehicle loads would also be the same. With Alternatives Three and Five, transit use is projected to marginally decrease relative to the No Build Alternative (from 315,700 daily patrons to 314,700 daily). None of the build alternatives would therefore increase transit vehicle loads.

Other Operational Issues. MUNI operates a layover yard along Steuart Street between Market and Mission Streets. MUNI has plans for an expansion of this facility to accommodate future operational needs. The No Build Alternative would not allow the planned expansion of this MUNI facility, which is constrained by the existing Embarcadero roadway. All build alternatives, however, include a modified roadway alignment that would accommodate the expansion, and would therefore create an opportunity for improved operating conditions. As a result of the planned layover yard expansion, MUNI would be able to use articulated buses in the layover yard, providing increased operational flexibility.

Under all build alternatives, bus circulation in the vicinity of the layover yard would remain the same as existing conditions, except that longer electric buses could access the yard, and fewer, therefore, would "lay-over" on area streets. There would be no sizable (greater than ten seconds per vehicle) increases in traffic delay near the layover yard under any build alternative, and no bus routes would experience delay in the vicinity.

Golden Gate Bridge, Highway and Transportation District (GGBHTD)

GGBHTD Route 67, which provides connections for ferry passengers between the Ferry Building and the Civic Center, may be cancelled after construction of the MUNI F-Line. If so, elimination of the U-turn currently allowed from northbound Embarcadero to southbound

Embarcadero near Washington Street (as proposed for all alternatives including the No-Build alternative) would not impact this route. If the route is continued, U-turns would have to be made at Washington Street. The I-80 off-ramp at Second Street under the Second Street Option in Alternatives Three and Five would occur in the vicinity of GGBHTD buses that deadhead (non-revenue service) to the upper deck of the Transbay Terminal, access for which is on Second Street adjacent to the location where the new Second Street off-ramp would be located. No other GGBHTD routes would be affected by circulation changes proposed as part of any alternative.

GGBHTD routes would experience delays similar to those discussed for MUNI Routes 12 and 42 because they follow the same general alignment through the primary study area. In particular, GGBHTD routes use the Sansome and Battery one-way couplet and the Howard and Folsom one-way couplet to circulate through downtown San Francisco. Under all build alternatives, the Sansome and Battery Streets one-way couplet is predicted to experience improved travel times compared to the 2015 No Build condition (see Tables 4.5-15 and 4.5-16), as is the Howard and Folsom one-way couplet. GGBHTD routes using these streets to access the Transbay Terminal also travel on First and Fremont Streets which are predicted to experience increased delay of up to one minute, similar to MUNI Route 42.

No GGBHTD bus stop locations would be changed in any project alternative and, therefore, and transit vehicle loading would not increase over No Build 2015 levels under any build alternative.

Buses operating near GGBHTD's layover yard on the southeast corner of Folsom and Main Streets are not in revenue service (i.e., they do not carry passengers). Because each bus would access the yard a limited number of times each day (normally twice; once to enter the yard after the morning commute peak, and once to leave the yard to start the afternoon commute peak service), anticipated increases in traffic delay at intersections in the vicinity would have limited ability to affect transit revenue. Also, bus movements to and from the yard would generally not occur during peak traffic periods.

San Mateo County Transit District (SamTrans)

SamTrans bus route circulation through the study area would not be affected as a result of any project alternative.

SamTrans buses are projected to experience additional delay along their primary access route to the Transbay Terminal (Mission Street) by 2015. As discussed for MUNI, delay on Mission Street is not predicted to be caused by one of the project build alternatives, rather traffic analysis results show this delay will occur by 2015 in the No- Build Alternative and that the various build alternatives would all result in various degrees of delay reduction (Tables 4.5-15 and 4.5-16).

No SamTrans bus stop locations would be changed in any project alternative. Transit vehicle loading would not increase above No Build conditions for any build alternative. No other operational issues have been identified as points of concern for SamTrans buses in association with any project alternative.

Alameda - Contra Costa County Transit (AC Transit)

AC Transit buses access the upper deck of the Transbay Terminal using the Fremont Street off-ramp from I-80 westbound (the Bay Bridge) and do not travel on surface streets within the primary study area. The only potential delay associated with AC Transit services, therefore, would relate to traffic congestion on the I-80 freeway mainline or the Fremont ramp.

Table 4.5-8 displays the results of the freeway traffic analysis. Existing traffic speed on the first freeway segment on this table (Bay Bridge mainline to Fremont off-ramp) is described as 59 kph (37 mph) under normal conditions in the peak hour (7:30 a.m. to 8:30 a.m.). Speeds are projected at 42 kph (26.5 mph) for the year 2015 under the No Build Alternatives and Alternatives One, Two, and Four; and 41 kph (26 mph) for Alternatives Three and Five. The decrease in speed of about 16 kph (10 mph) between existing conditions and each of the 2015 scenarios implies additional travel time for AC Transit buses of about 60 to 90 seconds. The change between the 2015 No -Build Alternative (Alternative One) and the 2015 build alternatives (Alternatives Two-Five), however, is negligible, and the slower speeds are entirely the result of growth in travel that would occur between 1993 and 2015, and not the result of any project alternative. (For further information on freeway operations in 2015, under the No Build and build alternatives, see Section 4.5.1, pp. 282-292.)

Analysis of the design of the existing and proposed Fremont Street off ramp (which would be realigned in Alternatives Three, Four, and Five) indicates that roughly 365 meter (1,200 feet) of queuing space would be available for automobiles waiting at the Fremont ramp touchdown before the backup would reach the point where AC Transit buses split off to access the Transbay Terminal upper deck. This length of ramp would contain two lanes, with four stacking lanes at the traffic signal. Analysis of queuing data from the TRAF-NETSIM model indicates that under no circumstance would the queue from the ramp touch-down be likely to back up the full 365 meter (1,200 feet) to the point where. AC Transit buses would be adversely affected.

Other Transit Services

Amtrak, Greyhound, Airporter, and tour bus operators would experience delays in 2015 consistent with traffic congestion locations identified for the build and no build alternatives (see Section 4.5.1). Table 4.5-15 highlights the major travel routes used by buses and Table 4.5-16 shows the key locations where changes in congestion are projected to occur. To the extent Amtrak, Greyhound, Airporter, and tour buses pass through those locations, they would experience increased delay as compared to existing conditions.

In general, benefits would be realized for most of these operations because of the improved roadway facilities, traffic operations, and pedestrian facilities incorporated as part of the build alternatives. The net result would be improved vehicle circulation and bus stop access by patrons and an area-wide reduction in average delay for each vehicle when compared to the No Build Alternative.

It is assumed that CalTrain would be extended to the Financial District on an underground route through the primary study area and services would therefore not be influenced by surface street conditions.

Side-Running MUNI F-Line Variant

As explained in the Related Projects section on p. 92, all alternatives to replacement of the Embarcadero Freeway and the TSS would accommodate the F-Line, and have been analyzed assuming the planned median-running alignment.

At the suggestion of the City Planning Commission, however, a modified F-Line alignment was analyzed which would place the double tracks on the east side of the Embarcadero roadway between Mission and Washington Streets (i.e., in front of the Ferry Building) before crossing to the roadway median. This variation would make transfers between ferries and the F-Line easier by bringing the F-Line closer to ferry terminals, and would provide easier access between the F-Line, the Ferry Building, and water-side open spaces.

Because alignment of the F-Line is integral to the Embarcadero roadway, impacts of the build alternatives would be somewhat different than described elsewhere in this EIS/EIR if the side-running F-Line variant were to be adopted. In general, traffic congestion along the Embarcadero would increase with the side-running F-Line, and average travel speeds would decrease. Specifically, The Embarcadero/Washington intersection would degrade in the PM peak hour from LOS C under Alternative Three with the median-running F-Line, to LOS D with the side-running F-Line. (The same intersection functions at LOS A under existing conditions, and is projected to function at LOS B under the No Build Alternative.)[27]

At the same time, the side-running F-Line would increase the potential for conflicts between pedestrians and vehicles (both F-Line vehicles and automobiles), and would pose a hazard to bicyclists if the F-Line tracks crossed the northbound bicycle lane at an oblique angle. These safety concerns could be addressed by physically separating the F-Line tracks from pedestrian areas, creating clearly delineated pedestrian queuing areas within crosswalks, and providing a crossing angle closer to 90 degrees . All of these changes would influence the urban design of the area, and decrease the size of pedestrian facilities proposed in all build alternatives. Driveways to waterfront facilities along the side-running alignment would have to be signalized in order to prevent vehicle/transit conflicts, and the F-Line would have to cross-over into the roadway median immediately after the Embarcadero/Washington intersection, in order to reduce the likelihood that vehicles turning left from the Embarcadero-northbound onto Washington Street would queue-up over the F-Line tracks.

Transit operations would also be affected with the side-running F-Line variant, such that speeds could be reduced from about 25 to 30 mph with the F-Line in the median, to about 10 mph for areas where the F-Line would run through pedestrian/plaza areas. Any reduction in speed would in turn increase travel times for the service provided, and could make the F-Line less attractive to patrons. In addition, buses using the loading bays proposed in front of the Ferry Building in all build alternatives would occasionally have to wait with their doors closed to prevent bus passengers from running across the F-Line tracks to catch an approaching F-Line vehicle.

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[27] Korve Engineering, Inc. "F-Line Side-Running Alignment in Front of the Ferry Building; Draft Report," June 26, 1995. This brief quantitative and qualitative evaluation of the side-running F-Line proposal is incorporated here by reference. A copy of the full report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street.

Construction Period Transit

All build alternatives would entail construction activities along The Embarcadero between Folsom Street and Broadway. In addition, two of the build alternatives (Alternatives Three and Five) would construct new I-80 freeway ramps. The Second Street Option of Alternatives Three and Five would realign the Fremont Street off-ramp from I-80 westbound to the Fremont and Folsom Street intersection and would construct new on- and off-ramps near Second Street. The Fourth Street Option of Alternative Three and Five would realign the Fremont off-ramp, construct a Second Street on-ramp, and modify the Fourth Street off-ramp. Alternative Four would involve realignment of the Fremont Street off-ramp. All build alternatives would also involve lane restripings and various minor physical or operational improvements within the downtown area.

Construction activities associated with the roadway alternatives would not spill over onto the existing MUNI layover yard site at Mission Street, between Steuart Street and The Embarcadero, except insofar as construction of the MUNI F-Line light-rail extension through the north end of the yard is accomplished concurrently with roadway construction.

Construction improvements associated with proposed restripings to add or reconfigure lane geometries, addition of turning pockets, designation of HOV lanes and minor changes to bus boarding platforms would be short term in nature and would be accomplished during periods when traffic volumes are light. Some lane closures would occur but other lanes would remain open to allow continued circulation by buses during the short periods of time required to complete these construction activities.

Construction along The Embarcadero in the build alternatives is expected to take about 20 months to complete: 16 months for traffic lane and pedestrian facility construction, followed by 4 months of F-Line trackbed construction in the roadway median. Regardless of the alternative, the construction plan maintains a minimum of three open lanes of traffic in each direction throughout the 16-month construction phase involving lane construction. This would entail temporary rerouting of north or southbound traffic onto lanes of the opposite direction of travel while construction activities occur on the opposite lanes. The F-Line construction in the roadway median would not reduce the number of traffic lanes or restrict transit vehicle movements along The Embarcadero.

Shifting of lanes would move buses away from their existing bus stop locations and affect patron access to bus stops. Because pedestrian facilities -- sidewalks and crosswalks -- along The Embarcadero would also be under construction, transit patrons could be inconvenienced. The Project contractor would be required to contract transit providers to arrange for relocated bus stops, no more than one or two blocks north or south, whenever construction would seriously affect stop locations along The Embarcadero. Transit access would also be considered in developing the final construction staging plans. (See mitigation section on p. 340.)

I-80 off-ramp construction at Second Street under the Second Street Option in Alternatives Three and Five would occur in the vicinity of MUNI Route 15 and GGBHTD buses that deadhead (non-revenue service) to the upper deck of the Transbay Terminal, access for which is on Second Street adjacent to the location where the new Second Street off-ramp would be located. Also, construction of elevated sections of both the on- and off-ramps (the on-ramp would be constructed with both options of Alternatives Three and Five) would occur in the vicinity of Third Street and MUNI Routes 9X, 9AX, 9BX, 15, 30, 45, and 76 and GGBHTD Routes 28 and 30.

The preliminary stage construction plan prepared for this project specifies that both Second and Third Streets would not be disrupted during normal working hours, which would avoid any reduction in roadway capacities during peak travel periods. During off-peak periods, some lane closures would be required, but other lanes on both Second and Third Streets would still be available for through traffic.

Construction of the elevated sections of the ramps at Third Street could affect the availability of electric trolley bus wires used by MUNI Routes 30 and 45. The construction plan shows that clearances would be maintained throughout the construction period, but that the wires will probably become temporarily unavailable during short periods of time at night when power would be shut off for safety reasons or lanes are blocked by construction vehicles. Because neither Route 30 or 45 operate late night (owl) service on Third Street, this should not affect MUNI service. To ensure maintenance of the trolley wires during the operating hours of Routes 30 and 45 the final construction staging plans would specify early notification of MUNI when where work is scheduled in the vicinity, and coordination regarding availability of the wires. (See mitigation section, below.)

Construction of the Second Street I-80 on-ramp near the intersection of Harrison and Essex in Alternatives Three and Five is not expected to result in any operational problems because no buses currently use this segment of Harrison Street for revenue service. Likewise, construction of the realigned Fremont and Folsom off-ramp in Alternatives Three, Four and Five, which would occur adjacent to MUNI Routes 12, 42, and 76, would not cause any operational problems because all construction activities associated with the ramp would occur off-street and no lane closures are planned. Construction of the modified Fourth Street off-ramp in the Fourth Street Option of Alternatives Three and Five, which would occur in the vicinity of MUNI Routes 9X, 9AX, 9BX, 30, 45, and 76 as well as GGBHTD Routes 28 and 30 which serve the Caltrain station at Fourth and Townsend, would also not affect surface streets so no operational problems related to transit services would occur.

In all locations where construction activities would occur, traffic congestion and attendant transit vehicle delay could potentially occur. Any delays experienced would be temporary and intermittent, and would not be likely to affect all routes equally.

Transit Mitigation Measures

The mitigations presented below address transit-related operational or service deficiencies identified on the previous pages, even if those deficiencies would not necessarily constitute a significant impact. These measures are specific with regard to location and scope, and are deemed feasible at the planning level.

- To eliminate the potential deficiency of transit bus loading space in front of the Ferry Building, which could substantially affect traffic circulation along the northbound lanes of the Embarcadero if busses were to stop along the curb during peak periods, the City would implement one of the following mitigation options:

  a) Modify the lengths of the two 200-foot loading bays proposed in all alternatives, such that one bay would be long enough (about 300 feet) for four busses to stop simultaneously. Implementation of this mitigation measure would limit the size of the pedestrian area proposed for immediately in front of the Ferry Building in all alternatives and would have urban design implications for that area.

b) Widen one or both of the two 200-foot loading bays proposed (to about 45 feet), such that either the northern bay could accommodate bus loading inside and outside, or both bays could accommodate bus loading outside with automobile loading inside. ("Inside" means within the bay; "outside" means against the curb or island that separates the bay from the roadway.) Implementation of this mitigation measure would limit the size of the pedestrian area proposed for immediately in front of the Ferry Building in all alternatives and would have urban design implications for that area.

c) Provide a supplemental loading area somewhere else in the vicinity of the Ferry Building. Implementation of this measure would have different effects, depending on the location selected for the supplemental loading area. If the supplemental area was in front of Pier One or the Agriculture Building, the width of pedestrian facilities in those areas would be reduced. If the supplemental area was along the southbound lanes of the roadway, the width of pedestrian facilities in that area and in front of the Ferry Building would be reduced. If the supplemental area was between the Agriculture Building and the Ferry Building, decking-over or "filling" a piece of the Bay would be required. If the supplemental area was on the Ferry Plaza, pedestrian access areas could be reduced. In general, policies of the Bay Conservation and Development Commission (BCDC) would discourage filling the Bay or restricting pedestrian access on the Ferry Plaza. Filling a piece of the Bay would require authorization from BCDC, as well as a Section 404 permit from the US Army Corps of Engineers, and would have undetermined impacts requiring additional analysis prior to selection of this location.

- To minimize or eliminate inconveniences associated with relocation of bus stops during construction, the City would contact each transit operator (primarily MUNI and GGBHTD) whose bus stops would be moved during construction and determine the best temporary location for these stops during each phase of the construction period. The ability of buses to stop along The Embarcadero would be considered in developing the final construction staging plans, and bus stops would be relocated no more than one block from their existing locations.

- In Alternatives Three and Five, the electric trolley wires on Third Street at the I-80 overpass used by MUNI Routes 30 and 45 would be affected during certain construction phases. Analysis of construction phasing indicates the trolley wires can be kept available except for short periods of time at night when Routes 30 and 45 do not operate on Third Street.

- To ensure maintenance of overhead trolley wires during the operating hours of MUNI routes 30 and 45, the final construction staging plan would require early notification of MUNI when work is scheduled in the vicinity, and coordination regarding availability of the wires.

4.5.3 PARKING

Changes to the Parking Inventory

Within the primary and focused parking study areas depicted in Figure 3.3-7 and Figure 3.3-8, the proposed alternatives would variously affect the pre-earthquake and existing supply of on- and off- street parking. With the exception of the No Build Alternative, all alternatives would decrease the overall supply of off-street parking and increase the number of on-street spaces along The Embarcadero available in off-peak periods. Table 4.5-18 summarizes changes to the existing and pre-earthquake parking inventory by alternative, as described below. While some of the parcels vacated by removal of the Embarcadero Freeway and TSS would be reused for transportation improvements proposed under the project alternatives, other parcels can be reused for other uses. Potential changes in parking inventory on parcels available for other uses are not included in Table 4.5-18.

Alternative One, the No Build, would not increase or decrease the supply of off-street or on-street parking, Under this alternative, it is assumed that the existing parking in the Embarcadero median would be reconfigured to accommodate the planned MUNI F-Line alignment, and would be supplemented by additional parking areas or by the use of valet parking to maintain the current number of spaces.

Each build alternative would displace all of the Embarcadero median parking located between Mission Street and Broadway. In 1994, this parking was managed as 244 long-term and 100 short-term spaces. In 1989, the same area had a total of 317 spaces. In addition, the 79 off-street short-term metered spaces which are located on either side of the front doors of the Ferry Building would be displaced by each of the build alternatives. In terms of the 1994 off-street

TABLE 4.5-18

CHANGES IN PARKING INVENTORY BY ALTERNATIVE (COMPARED TO EXISTING)

Location	Embarcadero Median	Ferry Building Entrance	Broadway to Howard (net gain)[1]	Folsom / Fremont Off-Ramp	Second Street Off-Ramp	Fremont Street	Harrison Street	Totals
Alternative 1								
Off-Street	0	0	0	0	0	-	-	0
On-Street	0	0	0	0	0	0	-	0
Alternative 2								
Off-Street	(344)	(79)	-	0	0	-	-	(423)
On-Street	-	-	52	-	0	(2)	-	50
Alternative 3A								
Off-Street	(344)	(79)	-	(300)	(55)	-	-	(778)
On-Street	-	-	81	-	(33)	(2)	-	46
Alternative 3B								
Off-Street	(344)	(79)	-	(300)	0	-	-	(723)
On-Street	-	-	81	-	0	(2)	-	79
Alternative 4								
Off-Street	(344)	(79)	-	(300)	0	-	-	(723)
On-Street	-	-	52	-	0	(2)	-	50
Alternative 5A								
Off-Street	(344)	(79)	-	(300)	(55)	-	-	(778)
On-Street	-	-	84	-	(33)	(2)	-	49
Alternative 5B								
Off-Street	(344)	(79)	-	(300)	0	-	-	(723)
On-Street	-	-	84	-	0	(2)	-	82

[1] New on-street parking on Embarcadero (which results in the net gain) would be for off-peak periods only.

Source: Douglas Wright Consulting; Port of San Francisco parking supply, each build alternative would displace a total of about 423 spaces in the Ferry Building area.

Each build alternative would also displace 135 existing curb-side on-street parking spaces along The Embarcadero, but would provide an Embarcadero roadway of two moving traffic lanes in both direction during all hours, with a curb lane in both directions which would be used as a traffic lane during the peak hours, and as on-street parking during non-peak hours. The exceptions to this would be at locations on the northbound lanes where "view corridors" to the Bay are considered to exist; in general, Bay Conservation and Development Commission (BCDC) policies do not allow parking at these locations. Consequently, no curb-side parking would be provided on the bayside of the Embarcadero roadway from Howard Street to the northern end of the Ferry Building, as well as at the foot of Broadway and Pier 7. The estimated number of on-street parking spaces (non-peak hours only) available in the build alternatives, from Howard Street to Broadway, is a total of approximately 184 off-peak spaces, except Alternative Five would have three more spaces because of a curved southbound roadway.

Alternatives Three and Five also propose a non-peak hour parking lane in the northbound roadway between Folsom and Howard Streets. This parking lane could accommodate 29 on-street parking spaces. Consequently, there would be a total of about 213 on-street spaces in Alternative Three, and about 216 on-street spaces in Alternative Five.

Prior to the earthquake, 282 off-street surface parking spaces existed at the site of the Folsom and Fremont Streets off-ramp, immediately northwest of the Folsom and Fremont Streets intersection. Following removal of the TSS, 300 surface parking spaces were created on the cleared site. In Alternatives Three, Four and Five, the 300 spaces would be displaced by the realignment of the Fremont Street off-ramp.

The proposed Second Street off-ramp under the Second Street Option of Alternatives Three and Five would displace approximately 55 off-street parking spaces located at the site of the proposed off-ramp, 30 on-street spaces along the north curb of Stillman Street between Second and Third Streets, and 3 on-street spaces on the west side of Second Street where the proposed off-ramp meets Second Street. The same number of spaces existed at these locations prior to the earthquake.

Two curb-side metered spaces on Fremont Street would be displaced in all build alternatives. Other street and intersection improvements included in all build alternatives, as well as the Harrison Street on-ramp proposed under Alternatives Three and Five would not permanently reduce parking in the primary parking study area. However, all build alternatives would eliminate peak period use of 20 metered spaces on Bush Street between Montgomery and Battery Streets, and 84 metered or one-hour limit spaces on First Street between Market and Harrison Streets, due to proposed operational changes on these streets.

While the loss of parking spaces and the inconvenience to current users would not be considered a significant environmental impact in the urban context of San Francisco, potential economic impacts under NEPA are discussed in Section 4.6.3. There is no evidence that indirect environmental impacts (i.e. measureable increases in noise or air pollutants) are associated with parking displacements that occur from time to time in downtown San Francisco. In general drivers seek and find alternate parking facilities or shift to transit. Over the last 20-25 years, San Francisco employment has increased faster than the parking supply, shifts to transit have occurred, and regional air quality has improved.

Construction Period Changes

In addition to the permanent changes to the parking inventory described above, construction would temporarily affect the parking supply in the vicinity of the project. In the Second Street Option of Alternatives Three and Five, the approximately 100 off-street spaces between Stillman and the freeway structure would be removed from service (55 of the 100 would be permanently displaced, along with 33 on-street spaces). Construction of the Harrison Street on-ramp would require the temporary removal of eight on-street spaces on both Second and Third Streets, and 80 off-street spaces north of the bridge structure at Third Street, to allow overhead construction, in Alternatives Three and Five. On-street parking along The Embarcadero between Howard Street and Broadway would also be lost during the estimated 16-20 month construction period.

4.5.4 GOODS MOVEMENT

When compared to existing and pre-earthquake conditions, each of the build alternatives would improve truck circulation within the study area, and all, except Alternative Two, would benefit the movement of trucks between the study area and locations elsewhere. The No Build Alternative would not provide any benefits for goods movements since it would not improve local streets or the link between the central waterfront and the regional freeway system.

All build alternatives would improve circulation conditions on The Embarcadero through the provision of left turn opportunities and refuges at Mission Street, Washington Street, and Broadway. Truck accessibility to and from the Ferry Building and adjacent locations would be improved under all build alternatives, with easier turning movements and enhanced accessibility resulting from the intersection improvements at Mission and Washington Streets.

The realigned off-ramp at Folsom and Fremont Streets in Alternatives Three, Four and Five would shift the route for trucks seeking The Embarcadero from the Bay Bridge from Howard Street to Folsom Street. In addition to the added lane capacity of Folsom Street (compared with Howard Street), Folsom Street provides a direct route to The Embarcadero, with no turns required. Also, the modified ramp section would be less steep (about 8% versus 11%) than the existing off-ramp. Provision of the proposed Harrison Street on-ramp under Alternatives Three, Four and Five, and the provision of the Second Street off-ramp (under the Second Street Option only) would also provide benefits to goods movements by eliminating truck movements on local streets west of Second Street.

Under the Fourth Street Option of Alternatives Three and Five , and under Alternatives Two and Four, trucks traveling eastbound on I-80 would continue to exit the freeway at Fourth Street and use local streets (Bryant, Third, Folsom) to access The Embarcadero.

All build alternatives would eliminate the use of curb-side loading spaces during peak periods on First Street between Market and Mission Streets. In all build alternatives, peak period truck travel time would increase slightly over existing conditions on First, Second, Third, Fourth, Bryant and Harrison Streets, and on The Embarcadero, because of projected peak period traffic congestion on these streets.

4.5.5 PEDESTRIAN AND BICYCLE FACILITIES

The study area for the pedestrian and bicycle analysis includes the Mid-Embarcadero area along both sides of The Embarcadero between Folsom Street to the south and Broadway to the north. All locations within this area containing non-motorized circulation facilities (sidewalks, crosswalks, or bicycle lanes) were analyzed, along with crosswalks at nine intersections potentially impacted by the Terminal Separator Structure (TSS) replacement ramps (along Folsom, Harrison, and Bryant Streets plus the intersections of First and Mission Streets and Fremont and Market Streets). Figure 4.5-15 shows the locations of intersections analyzed for pedestrian and bicycle impacts and the intersections where 2015 peak hour level of service under the various project alternatives is predicted to be "constrained", "crowded", or "jammed". Supplemental analyses were performed for areas where implementation of the project would result in reduced sidewalk widths. (See p. 217 for these locations.)

The pedestrian level of service (LOS) analysis uses the methodology developed by Pushkarev and Zupan (Urban Space For Pedestrians, 1975). Similar to the letter grades of LOS A to LOS F used to describe traffic conditions, the pedestrian flow regimens (or levels of service categories) range from Open to Jammed (see Table 4.5-19). The method calculates the amount of pedestrian crowding by comparing the pedestrian volume per minute with the effective walkway width and highlights any locations where unacceptable crowding would result. The Congested and Jammed pedestrian flow regimens are typically considered unacceptable. The Congested flow regimen is, as shown on the table, any flow of pedestrians exceeding 14 Pedestrians per Foot-of-Effective-Sidewalk-Width per Minute (p/f/m).[28]

As noted at the bottom of Table 4.5-19, sidewalk obstructions (mail boxes, newspaper racks, poles, trees, etc.) are an important consideration in measuring the available sidewalk widths and the resulting flow regimens of pedestrians.

The pedestrian flow regimens shown in Table 4.5-19 assumed pedestrians to be spaced out at random along a sidewalk. In the more crowded portions of the study area, especially along Market Street and for all cross walks, pedestrians form platoons or waves of denser groupings of pedestrians traveling together with less dense areas between them. Platoons represent involuntary groupings of pedestrians and as such should be distinguished from groups that walk together by choice.[29] Traffic signals are the major contributor to the formation of platoons.

Pushkarev and Zupan research of pedestrian platoons showed that on the average the formation of platoons will degrade the pedestrian flow rates by approximately 4 p/f/m or one

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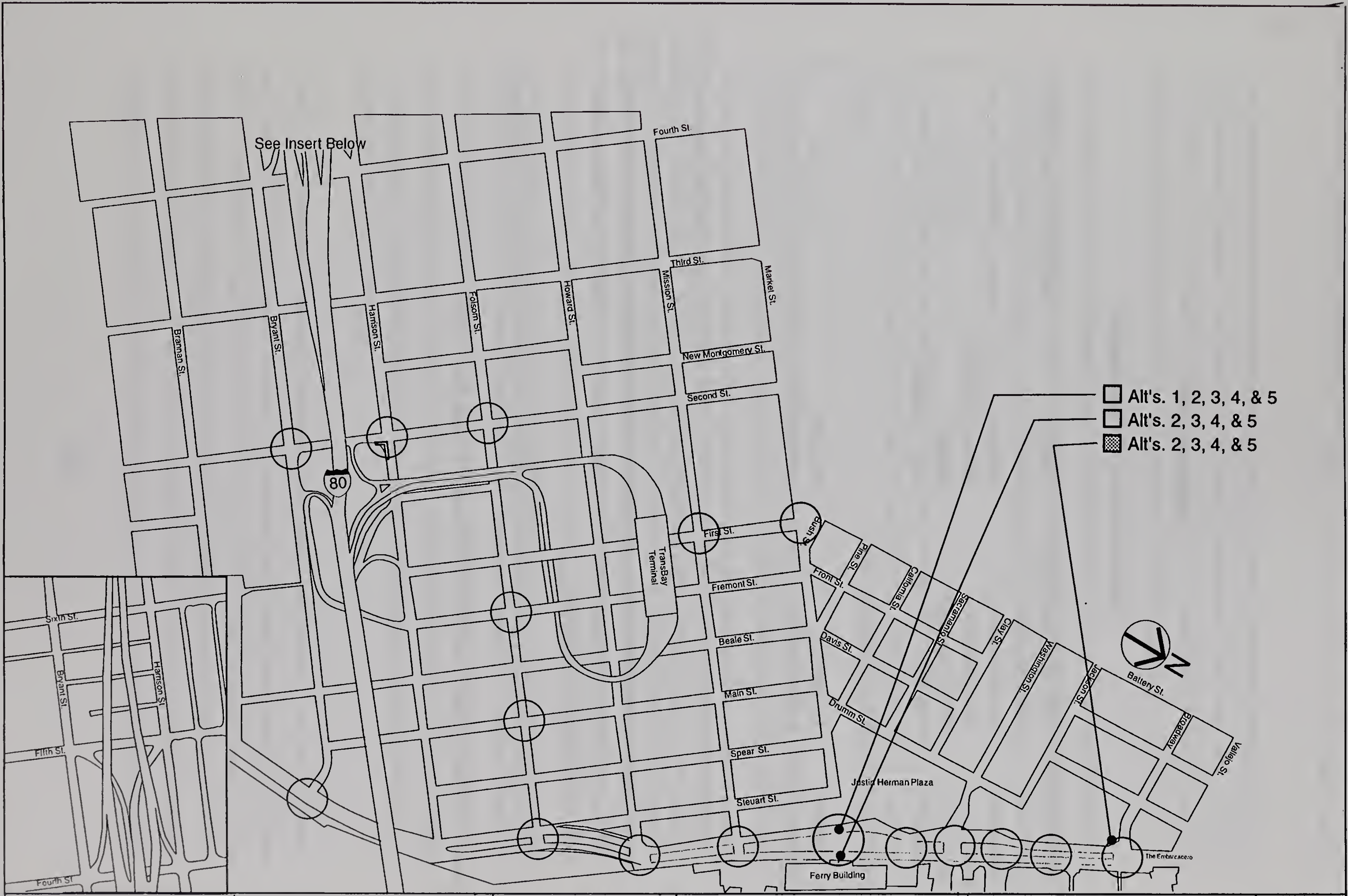
[28] For more details regarding pedestrian analysis methodology, please see the Transportation Background Report. A copy of this report is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

[29] Pushkarev, Boris S. and Zupan, Jeffrey M., *Urban Space for Pedestrians*, (Cambridge, MA: The MIT Press, 1975), p 95.



Source: Parsons Brinckerhoff Quade & Douglas, Inc.

LEGEND

☐ Constrained

▨ Crowded

○ Location Analyzed

GRAPHIC SCALE

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

PEDESTRIAN LEVEL OF SERVICE
2015 Peak Hour (Worst Case)

Figure 4.5-15

TABLE 4.5-19

PEDESTRIAN FLOW REGIMENS[1]

Flow Regimen	Walking Speed Choice	Conflicts	Average Flow Rate (p/f/m)
Open	Free Selection	None	0.0 - 0.5
Unimpeded	Some Selection	Minor	0.5 - 2.0
Impeded	Some Selection	Indirect Interaction	2.0 - 6.0
Constrained	Some Restriction	Multiple	6.0 - 10.0
Crowded	Restricted	High Probability	10.0 - 14.0
Design Limit - Upper Limit of Desired Flow			
Congested	All Reduced	Frequent	14.0 - 18.0
Jammed	Shuffle Only	Unavoidable	(2)

[1] Measurement of pedestrian activity is based on an average flow rate of pedestrians per foot of effective sidewalk width per minute (p/f/m). Total sidewalk width is measured as the distance from curb to building. However, effective width is calculated by subtracting the width occupied by obstructions (such as newspaper racks, fire hydrants, etc.), and allowing for a buffer of 1.5 feet on each side of the sidewalk (because pedestrians avoid brushing up against a building or walking on the edge of the curb). Thus a sidewalk with a total width of ten feet may have a much narrower effective width if trees, poles, or other obstructions block part of the sidewalk.

(2) For Jammed flow, the attempted rate of flow may not be possible, with actual flow degrading to zero at complete breakdown.

Source: Pushkarev and Zupan, *Urban Space for Pedestrians*, (Cambridge, Mass., 1975).

flow regimen level worse than that shown is Table 4.5-19 which describes pedestrian flows for homogeneous streams. This means that although pedestrian flows less than 14 p/f/m (Congested) are considered acceptable, when platooning of pedestrians are considered, then pedestrian flows of greater than 10 p/f/m (Crowded) would be unacceptable.

The platooning effect at crosswalks was estimated by using the traffic signal walk time to calculate the pedestrians per foot of effective width per minute. Instead of dividing the hourly pedestrian flow by 60 minutes, the pedestrian volume was divided by 60 minutes times the percent of walk time available for that crosswalk.

Bicyclists were counted as pedestrians if they used a sidewalk or crosswalk, or as motor vehicles if they used the roadway. Bicycles are analyzed only where there are bicycle-only facilities.

Alternative One (No-Build) would retain pedestrian and bicycle facilities as they exist today. In the build alternatives (Alternatives Two through Five), pedestrian facilities would be improved along The Embarcadero roadway, where in most areas the land-side sidewalk and the bay-side promenade would be widened.

Bicycle facilities would also be improved along The Embarcadero for all build alternatives. The outside vehicle lane for each direction would be 4.5 meters (15 feet) wide to provide the extra width needed for bicyclists. During the commute hours these lanes would provide 3.3 meters (11 feet) of width for auto travel plus 1.2 meters (4 feet) for bicycles. During the midday, these lanes would provide 2.4 meters (8 feet) of width for parking, leaving 2.1 meters (7 feet) for bicycle use. Because use of the curb lanes would alternate between traffic and parking, the bicycle lanes could not be stripped, so they would be considered Class Three bikeways, which are signed only. The bikeway's width would be consistent with Class Two lanes, which are 2.4 meters (8 feet) wide and stripped.

The 2015 pedestrian volumes were developed by applying growth factors to existing pedestrian volumes. Growth factors were based on the expected employment anticipated by the year 2015, as developed by adjusting the MTC 700-zone system to reflect the distribution of some expected growth to the land vacated by the removal of the Embarcadero Freeway and the TSS. (See further explanations, pp. 240-241.) The modified growth projections provide reasonable estimates of total pedestrian volumes within an area. On top of this growth was added pedestrians associated with new transit passenger trips described in Section 4.5.2. The new transit service and growth in patronage include additional ferry trips to the Ferry Terminal, the F-Line light rail service along The Embarcadero, and the MUNI Metro extension. The design of any future development on vacated sites may concentrate pedestrian volumes on particular walkways. Given the relatively low pedestrian volumes for most the study area crosswalks and sidewalks, a doubling or even tripling of pedestrian volumes would not lead to unacceptable pedestrian congestion at most locations. Future proposals for development on vacated sites would likely require environmental analysis that would identify potential problem areas on adjacent sidewalks and identify mitigations to avoid any development-specific adverse impacts.

For all the build alternatives the future pedestrian volumes were redistributed based on changes to pedestrian facilities, including new or removed crosswalks, and improved sidewalks, and to changes in pedestrian circulation due to changes to parking facilities. The existing unsignalized crosswalk crossing The Embarcadero at Pier 3 would be relocated to near Pier 5 and it would be signalized. A new signalized crosswalk crossing The Embarcadero would be constructed at the MUNI bus layover area north of Mission Street.

Depending on location and time of day, 2015 pedestrian volumes in the downtown area are projected to increase from between 7 to 60 percent above existing conditions[30] for the Mid-Embarcadero area and from 6 to 207 percent greater than existing for the intersections analyzed in the TSS area. The 6 percent growth is projected for the Fourth and Bryant Street intersection, where the land use is not expected to change significantly. The 207 percent growth is for the Main and Folsom Streets intersection adjacent to parcels vacated by removal of the Embarcadero Freeway and TSS.

Under the 2015 No Build Alternative, pedestrian flow conditions would be acceptable for both the Mid-Embarcadero and TSS areas. The Ferry Building crosswalk of the southbound lanes of The Embarcadero would have the highest volumes of any location in the vicinity, and its projected pedestrian flow regimen would be Constrained or 7 p/f/m.

The pedestrian operations analysis for 2015 for all the build alternatives are summarized in Figure 4.5-15. Generally, the various build alternatives would, when compared to the pre-earthquake, existing, and the 2015 No Build conditions, improve pedestrian circulation in the study area because of new sidewalks or increased sidewalk and crosswalk widths. However, at a few locations where reduced sidewalk widths are proposed, this reduction in combination with the increased pedestrian volumes projected for 2015 would result in a deterioration of pedestrian flow regimens, compared with the No Build Alternative. These locations are described below.

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[30] Pedestrian counts taken during November 1992, April 1993 and May 1994.

In the build Alternatives Two to Five, the sidewalk along the west side of The Embarcadero just south of Broadway would be narrowed from the existing 2.4 meters(8 feet) wide to 1.8 meters (6 feet) in width. For the 330 projected noon peak hour pedestrians, the level of service would deteriorate compared to the No Build condition from an estimated 2 p/f/m or Impeded pedestrian flow regimen to an estimated 11 p/f/m Crowded pedestrian flow regimen.

In all build alternatives, the sidewalk along the west side of The Embarcadero between Piers 3 and 5 would be narrowed from the existing 6.7 meters (22 feet) to 4.5 meters (15 feet). 2015 pedestrian level of service at this location would deteiorate compared to the No Build condition from an estimated 0.9 p/f/m (Unimpeded) to an estimated 1.4 p/f/m (Unimpeded).

In all build alternatives, the west sidewalk of The Embarcadero through the MUNI bus layover area would be narrowed from the existing 6.1 meters (20 feet) to 4.5 meters (15 feet), in order to accommodate the planned expansion of the MUNI bus layover facility. 2015 pedestrian level of service would change compared to the No Build condition from an estimated 0.4 p/f/m/ (Open) to an estimated 0.7 p/f/m (Unimpeded).

The sidewalk on the west side of Fremont Street between Howard and Folsom Streets is currently blocked where it crosses the unsignalized Bay Bridge off-ramp. With Alternatives Three, Four and Five, this off-ramp may be moved southward to the signalized intersection of Fremont and Folsom Streets, which would open up the sidewalk on the west side of Fremont, and improve pedestrian circulation.

Under the Second Street Option of Alternatives Three and Five, the north sidewalk of Stillman Street between Second and Third Streets would be eliminated for the proposed I-80 eastbound off-ramp. There is, however, sufficient capacity on the south sidewalk of Stillman street to maintain pedestrian access and an acceptable level of service under 2015 conditions.

For the Fourth Street Option of Alternatives Three and Five, the crosswalk at the Bryant and Fourth Street intersection crossing the widened I-80 eastbound off-ramp at Fourth Street would be lengthened by 12 feet. There is currently sufficient green time during the Bryant and Fourth Street traffic signal phases for pedestrians to cross the extended ramp at this location. As with existing conditions, pedestrians walking along the sidewalk on the west side of Fourth Street would not be able to cross the off-ramp and Bryant Street in one signal phase, but would have to use two signal cycles.

There are few pedestrians in the vicinity of the Harrison Street and Essex Street intersection and there is only one legal crosswalk at this intersection (across Essex Street on the north side of Harrison Street). The restriping changes proposed in Alternatives Three, Four and Five would not affect this crosswalk. The other potential pedestrian crossings are prohibited with signs. At the intersection of Essex and Folsom Streets, the eastbound to southbound right turn at this unsignalized intersection would experience an increase in traffic volumes due to the diversion of eastbound Harrison Street users and also the new HOV lanes on Essex Street under Alternatives Three, Four, and Five. In addition to the current double right-turn lane of Folsom Street into the general use lanes on the west side of Essex Street, there would be HOV users from Folsom Street turning right into the HOV lane on the east side of Essex Street, effectively forming a triple right-turn lane. The increased traffic and the triple right turn would increase the potential for conflicts with any pedestrians who would ignore the prohibition on crossing at this location.

For all build alternatives, the traffic signal cycle time along The Embarcadero was assumed to increase from the present 80 seconds to 100 seconds during the AM and PM peak periods in order to maximize automobile circulation, consistent with Section 4.5.1 of this report. The pedestrian analysis assumed the noontime cycle length would remain at the present 80 seconds. The actual cycle lengths may change based on additional analysis to match that of the adjacent sections of The Embarcadero.

With the 100-second cycle, the cross streets (Bryant Street to Broadway) would have 23 to 29 seconds for the pedestrian phase, and the signals protecting crosswalk-only locations would have 17 seconds for the pedestrian phase. Possible effects of lengthening the traffic signal cycle and restricting pedestrian walk time include more queuing of pedestrians on sidewalks waiting for the pedestrian "walk" signal phase and larger pulses of pedestrians crossing during the available green time than the existing signal timing. Also, similar to existing conditions, pedestrians would be unable to cross both the northbound and southbound lanes of The Embarcadero in a single signal cycle.

At the Market Street/Ferry Building crossing of The Embarcadero the walk phase time would reduce from its current 29 percent of the hour to 17 percent of the hour. With the widening of the crosswalk to 80 feet, this loss in effective walk time would, in 2015, during the PM peak hour, cause the pedestrian flow regime for the Ferry Building crosswalk of the northbound lane of The Embarcadero to deteriorate from an Impeded flow regimen in the No Build condition to a Constrained flow regimen for the build alternatives.

The duration of the pedestrian walk signal phase and the width of The Embarcadero in all build alternatives, means that most pedestrians would require two traffic signal cycles to cross. The two-step crossing plus the 100 second signal cycle length during the peak hours would increase the delay or waiting time required for pedestrians to cross The Embarcadero. The average delay per pedestrian during peak hours is estimated to be approximately 32 seconds.

For all build alternatives, the total width of The Embarcadero typically would be 37 meters (120 feet), including the median, with two exceptions: at Mission Street it would be about 27.4 meters (90 feet wide); and at the Ferry Building it would be 40 meters (132 feet), including a 17.4-meter (57-foot) median, for Alternatives Two, Three and Four, or 68.8 meters (225 feet), including a 46-meter (150-foot) median, for Alternative Five. For the best case at Mission Street, the crossing of The Embarcadero would have an estimated 29 seconds for the walk phase. At an average walking speed of 1.2 meters (4 feet) per second the walk signal phase would provide enough time to walk about 33.4 meters (116 feet) and so pedestrians could cross in one walk phase. For all the other crosswalks, which are 37 meters (120 feet) or longer, the walk time would be insufficient for the average pedestrian to cross both the north and southbound traffic lanes in one walk phase. For example, at the 37-meter (120-foot) long Broadway and Washington Street crosswalks, with the expected walk phase of 23 seconds, an average pedestrian could walk 28 meters (92 feet), insufficient to cross the full width of The Embarcadero in one signal phase.

All build alternatives would add a traffic lane for one-half block on Third Street, between Stevenson Street and Market Street, so that the entire section of Third Street between Mission and Market Street would have five traffic lanes. Currently, the fifth lane is dropped because the sharp curb radius at Market Street requires buses to take two lanes to make the turn. The added lane would, under all build alternatives, require narrowing the sidewalk on the east side of Third Street to improve the curb radius so that buses and other vehicles could simultaneously use all five lanes. The added lane would reduce the sidewalk width from 4.9 meters (16 feet) to 3 meters (10 feet), but the pedestrian Level of Service would remain Impeded (from 2.4 to 3.7 p/f/m). The triangular-shaped pedestrian island on the opposite side of Market Street would also be reduced in size by 1.8 meters (6 feet).

The triangular pedestrian island on the north side of Market Street at its intersection with Kearny and Geary Streets has sufficient storage space for pedestrians waiting for the walk signal. The island has approximately 55 square meters (600 square feet) of effective pedestrian storage area. If 1.8 meters (6 feet) of the island were removed from the Kearny Street side as proposed in all build alternatives, the island would have approximately 39 square meters (420 square feet) of effective storage area. The largest observed accumulation of pedestrians on the island was 25 persons[31], which would cover approximately 11.5 square meters (125 square feet).

All build alternatives would reconfigure Bryant Street's intersection with The Embarcadero, adding a traffic lane and requiring a narrower sidewalk on the right and/or left side of Bryant Street. This proposed change is projected to increase 2015 pedestrian flow, compared to the No Build condition, from 0.4 p/f/m (Open) to 1.0 p/f/m. Pedestrian level of service would remain acceptable in all build alternatives.

Pedestrian Storage Areas

Under all alternatives, at the Ferry Building/Market Street crosswalk of The Embarcadero, about 53 pedestrians would queue on the west side waiting to cross with 69 total pedestrians crossing during each signal cycle on the average during the PM peak hour. Field observations of sub-hourly peaks indicate that during the peak-of-the-peak that about 77% or 88 pedestrians would be queued on one side of the street with a total 115 pedestrians crossing during the busiest signal cycle.

According to Pushkarev and Zupan, persons waiting for a traffic signal typically use about 0.46 square meters (5 square feet) of sidewalk each. The worst case, with 88 persons in the queue, would require 41 square meters (440 square feet) of sidewalk on one side of the street or in the median. For Alternatives Two-Five the crosswalk of the northbound lanes would be 24.4 meters

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[31] Field Survey conducted on location in December 1994.

(80 feet) wide, so the average queue depth queue would be 1.7 meters (5.5 feet) for a 3.7-meter- (12-foot-) wide sidewalk. The same is true for the crosswalk of the southbound lanes for Alternatives Two-Four. For Alternative Five, the effective crosswalk of the southbound lanes (median width minus the F-Line tracks) would be 16.8 meters (55 feet) wide, so the average pedestrian queue depth would be 2.4 meters (8 feet) for a 4.6-meter- (15-foot-) wide sidewalk. Thus, all build alternatives would provide sufficient sidewalk area to store the projected number of persons and still allow pedestrians walking along the sidewalk sufficient room to pass.

In Alternative Five, pedestrians would have more space in The Embarcadero median than in any other build alternative. If the planned MUNI F-Line loops is in the median in front of the Ferry Building, its tracks would run parallel and adjacent to the median curb line next to the crosswalk. The consequence of this design could be that the effective crosswalk length would be lengthened from the planned 11.3 meters (37 feet) to approximately 15 meters (49 feet). With only 17 seconds of "walk" time planned for each crosswalk, pedestrians would be tempted to wait in the streetcar track area, increasing the likelihood of streetcar-pedestrian conflicts. For safety sake, the streetcars would have to move very slowly through the walkway area. Likewise, to avoid pedestrians the streetcars would have to move slowly through the Justin Herman Plaza area, if the loop configuration of the F-Line is implemented.

For Alternatives Two, Three and Four, the planned MUNI F-Line streetcar tracks would be in the center of the 17.4 meter (57 feet) wide Embarcadero median in front of the Ferry Building. There would be about 5 meters (16.5 feet) clearance on each side of the tracks to the edge of the roadway. This clearance would be adequate for pedestrians waiting to cross The Embarcadero between consecutive pedestrian signal cycles. For all other locations along The Embarcadero in all build alternatives there would be sufficient pedestrian storage space in the median area excluding the streetcar trackway.

Pedestrian Safety

A study of pedestrian accidents in downtown San Francisco found that crosswalk accidents were often the result of right-turn-on-red movements[32]. In this situation, if a northbound vehicle is making a right turn on red, the driver is looking for a gap in the stream of traffic on the east-west cross street. The driver tends to assume that the crosswalk of the east-west street will be empty, and focuses attention on the east-west traffic. A northbound pedestrian wishing to cross the east-west street on the east crosswalk will see the same gap in traffic and may be tempted to cross during the red signal. The pedestrian is also looking out for vehicles on the east-west street and does not expect or see the right-turn-on-red vehicle coming from behind. Under a similar scenario, the pedestrian and driver are both attempting to start early during the east-west yellow signal phase -- to jump the light. Again neither the pedestrian nor the driver are looking out for the other and so run the risk of an accident.

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[32] Destination Downtown: Streetscape Investments for a Workable City," The Downtown Streetscape Plan, draft for citizens review, August 1994, by San Francisco Planning Department.

Similar to right-on-red situations, channelized free right turns are potential safety hazards since motorists travel fast through them, but pedestrians seeing the crosswalk may think they are safe and therefore not adequately look out for danger. Though there are few pedestrians in this area, Alternatives Three, Four, and Five would remove a potentially hazardous channelized free right-turn from northbound Second Street to eastbound Harrison Street by making Harrison Street one-way westbound. The crosswalk between the sidewalk on the southeast corner and the safety island would be eliminated.

Because Alternatives Three, Four, and Five would eliminate the northbound to eastbound right turn at the southeast corner of Second and Harrison streets, some of these existing right turners would move to the Second and Folsom Streets intersection. Also, with Harrison Street one-way westbound, west of First Street, northbound drivers on Third Street would no longer be able to turn right onto Harrison Street, but would turn right at Folsom Street. The number of pedestrians using the east crosswalk at Third and Folsom would more than double the volume at Third and Harrison Streets under the current conditions; thus increasing the potential for conflicts between right turning vehicles and pedestrians.

Alternatives Three and Five would reopen Davis Street between Clay and Washington Streets which is a currently mapped but unimproved street, used as a pedestrian walkway. The result would be more vehicles along Washington Street between Davis Street and The Embarcadero.

For The Second Street Option of Alternatives Three and Five, the new off-ramp of eastbound I-80 would connect to Second Street at Stillman Street. Signalizing the crosswalk of the off-ramp on the west side of Second Street would create delays for pedestrians that currently experience little delay due to the light traffic volumes along Stillman Street. The existing pedestrian flows are estimated at 175 people per hour in the AM peak hour, 300 during the noon hour, and 200 during the PM peak hour. Year 2015 pedestrian flows are projected to increase by about 10% over the existing level. Other than delay at the signalized crosswalk, no operational problems are expected under all build alternatives.

Bicycle Operations

The No Build Alternative (Alternative One) would retain existing bicycle facilities while all build alternatives would provide improved bicycle facilities. The 4.5-meter (15-foot) outside lane along The Embarcadero under all build alternatives, would encourage bicyclists to use the street and not use the promenade, and would separate, to some extent, the bicycles from the traffic. During off-peak times, when parking would be allowed along The Embarcadero, under all alternatives, the 4.5-meter (15-foot) lane would allow bicyclists to keep clear of the parked vehicles and minimize the danger of running into an opened door of a parked car.

The planned F-Line is assumed to operate within The Embarcadero median in all alternatives. It would cross the southbound bicycle lane only at one location: Market Street (Alternative Five) or the southern end of Justin Herman Plaza (Alternatives Two, Three and Four and the No Build Alternative). In all cases, F-Line would cross the southbound bicycle lane at a right angle protected by a signal.

Construction Period Pedestrian and Bicycle Circulation

Construction of the Embarcadero roadway under any of the build alternatives (Alternatives Two-Five) would have the potential to disrupt pedestrian circulation.

Based on the preliminary construction plan developed for the project, construction of the roadway would occur for one-half of the street at a time, and the F-Line would not be operational until after the roadway construction is completed. It is assumed that construction of the pedestrian facilities associated with a particular side of the street would proceed in conjunction with construction of the street facilities themselves.

Under this scenario, at least one side of The Embarcadero would be available to pedestrians at any given time. This would result in some inconvenience to pedestrians traveling along sidewalks adjacent to the roadway because they may be required to cross The Embarcadero and use the sidewalk on the other side. Noon peak hour pedestrian movements would be less of an issue because many of these pedestrians are near the waterfront by choice; i.e., they are taking a noon-time stroll and can choose other paths. Pedestrian access to businesses and amenities along the waterfront would be maintained at all times.

The area around the Ferry Building is most sensitive to potential construction impacts because of the large number of pedestrians that use the promenade and cross The Embarcadero at this location. During construction of the northbound lanes of The Embarcadero, when the promenade would be improved up to the Ferry Building facade, sections of the promenade would most likely have to be closed entirely at certain times forcing pedestrians into the building's arcade. Also, during reconstruction of the crosswalk and adjacent sidewalks, the sidewalk capacities may be reduced or pedestrians may be forced into detours. This would potentially increase pedestrian trip lengths due to detours or congestion for the large volumes of pedestrians around the Ferry Building. All potential inconveniences would be temporary and intermittent. Closures of the promenade and use of the Ferry Building arcade for pedestrian circulation during roadway construction would be coordinated with the Port's Ferry Building rehabilitation project schedule.

Pedestrians and Bicycle Mitigation Measures

The mitigations presented below address pedestrian-related operational or service level deficiencies identified above, even if those deficiencies would not necessarily constitute a significant impact.

- For all build alternatives, during the noon peak hour, the sidewalk along the west side of The Embarcadero just south of Broadway is projected to experience pedestrian flow rates of 11 p/f/m or a flow regimen of Crowded, compared to 2.2 p/f/m or flow regimen of Impeded for the No Build Alternative. While not unacceptable, the crowded regimen would be improved from 11 p/f/m to 6 p/f/m or Impeded, by removing existing obstructions (newspaper racks, mail boxes, etc.) and/or not planting trees in this area of narrowed sidewalk.

- For Alternatives Three, Four and Five, the triple right turn at the unsignalized intersection of Folsom and Essex Streets could pose a safety problem for pedestrians who ignore the absence of a designated crosswalk, and cross Essex Street. To reduce the potential for automobile and pedestrian conflicts, the City would install pedestrian signs and barriers to direct pedestrians away from the crossing of Essex Street, and install a crosswalk on the east side of Essex Street to complement the one on the west side, so that pedestrians on the south sidewalk of Folsom Street can detour around the triple right-turn.

- For the Second Street Option of Alternatives Three and Five, the volume of right turning vehicles from Third Street onto Folsom Street and from Second Street onto Folsom Street would increase during the AM peak over the No Build condition, from an estimated 240 vehicles to 520 vehicles, increasing the potential for accidents between right-turners and pedestrians. To reduce this potential for conflicts, the City would prohibit right turns on red for northbound to eastbound movements at Third Street and Folsom Street and at Second Street and Folsom Street. As an alternative to prohibiting right turns on red, the City would consider implementation of a pedestrian "scramble phase" at this intersection, so that pedestrians would be able to cross the intersection without any conflict with vehicle traffic.

- During construction, large volumes of pedestrians walking in front of the Ferry Building and on the Ferry Building crosswalk may be inconvenienced by capacity reductions and/or temporary closure of pedestrian facilities. To reduce this inconvenience, the City would require the construction contractor to devise and implement a construction plan that would maintain maximum pedestrian flow capacity around the Ferry Building by avoiding closure of any pedestrian facilities wherever possible and by providing temporary alternative facilities as appropriate. Access would be maintained to nearby businesses, and signs would be used to indicate paths of travel to ferries and businesses.

4.6 SOCIAL AND ECONOMIC ENVIRONMENT

4.6.1 COMMUNITY COHESION

Community cohesion is typically characterized as the degree to which members of a community experience a sense of belonging to their neighborhood as a result of continued association. This experience is affected by a number of factors, including the mix of land uses and their distribution in an area, street patterns and the number and location of community focal points or activity centers. The City's Initial Study checklist, which is typically used to identify potential impacts under CEQA, describes the concept of community cohesion in the context of land use impacts that could "disrupt or divide the physical arrangement of an established community". Adverse impacts from roadway improvements on community cohesion typically occur when such improvements create physical, psychological and/or visual barriers that divide a community and its members, or reduce the attractiveness of important community focal points; beneficial effects on community cohesion typically occur when such barriers are eliminated. There are a number of communities within the vicinity of the project, and a number of focal points which serve an integral function in the cohesion of those communities.

Prior to their removal in 1991, the elevated Embarcadero Freeway and Terminal Separator Structure, and their associated ramps, created strong and adverse physical, visual and psychological barriers along the City's eastern waterfront, and in the lower South of Market Area. This is recognized in the Northeastern Waterfront Element of the San Francisco Master Plan, which comments on the adverse effects of these structures on community cohesiveness, and calls for their removal.

When compared to pre-earthquake conditions, all of the project alternatives would generally improve community cohesion because they would replace the Embarcadero Freeway and Terminal Separator Structure and their associated ramps with reduced-scale ramps and/or surface facilities. By not replacing the elevated freeway, The Embarcadero Promenade and other waterfront features have been "reunited" with the lower Market Street area, including the Financial District and South of Market Area.

Embarcadero Corridor

The elevated Embarcadero Freeway visually, physically and psychologically defined the eastern boundary of San Francisco, creating a barrier between the waterfront to its east and communities in the Mid-Embarcadero area to its west. Under existing conditions this physical barrier has been removed, but psychological barriers still exist due to the wide expanse of the Embarcadero roadway and the lack of inviting urban design features.

Under all build alternatives, new transportation and pedestrian facilities would be added to the area between Market Street and the Ferry Building. Under Alternatives Two, Three and Four, the sidewalk area immediately in front of the Ferry Building would be widened, creating an expanded Promenade or plaza area. These alternatives would also provide a small area adjacent to Justin Herman Plaza at its eastern edge, which could be integrated into the plaza's present design. (The specific design of this area and the widened promenade or plaza on the Ferry Building side of the roadway would be determined as part of the on-going Mid-Embarcadero Open Space planning process.)

The changes in open space characteristics under Alternatives Two, Three and Four would enhance the prominence of the Ferry Building as a community focal point, and provide linkages between The Embarcadero Promenade and Market Street. MUNI F-Line operation would also contribute to community cohesion in this area by increasing pedestrian activity and adding another community focal point to the area.

Under Alternative Five, an open space area would be created between the northbound and southbound lanes in front of the Ferry Building, but the area immediately in front of the Ferry Building itself would not be substantially widened. (The urban design treatment of this open space area would be addressed as part of the Mid-Embarcadero Open Space project.) Existing psychological and physical barriers in this area include the wide expanse of the Embarcadero roadway (including the median parking and pedestrian walkway), and the lack of urban design features such as consistent landscaping, street furniture, lighting and graphics. Like Alternatives Two, Three and Four, Alternative Five would strengthen the cohesion between the Ferry Building, Justin Herman Plaza and the Financial District, by reducing these barriers of the large expanse of the Embarcadero roadway and the lack of urban design features. A MUNI F-Line turn-around within the new open space area would also contribute to a re-emphasis of the role of Ferry Building as a transportation hub, in conjunction with the Ferry Building Renovation and Historic Rehabilitation project, the Downtown San Francisco Ferry Terminal project, and other planned transportation-related projects in the area.

Rincon Hill/South Park Area

In areas previously occupied by the Terminal Separator Structure and connecting ramps, these were the dominant visual features, creating visual and psychological barriers between surrounding areas and restricting the neighborhood qualities of the area. Since the removal of these structures, these areas have become more visually and physically accessible, and long-shaded areas have regained sun access during much of the day. Wide expanses of surface parking and vacant lots, however, still divide areas to the north of the Terminal Separator Structure corridor from Folsom Street and Rincon Hill to the south.

From the perspective of community cohesion, no noticeable changes would result from the realigned Fremont Street off-ramp under Alternatives Three, Four, and Five, nor from the new I-80 westbound on-ramp at Harrison and Essex Streets under Alternatives Three and Five, when compared to pre-earthquake conditions, because of the predominance of elevated transportation facilities in these areas. When compared to existing conditions, the reconfigured Fremont Street off-ramp would not introduce a significant new barrier between one part of an existing neighborhood and another, but would shift the existing ramp structure up to 61 meters (200 feet) farther south. The new I-80 westbound on-ramp would re-introduce an elevated ramp across Second Street just north of the I-80 freeway overpass, enlarging the width of the perceived barrier already created by the I-80 freeway.

The new I-80 eastbound off-ramp at Second Street (Alternatives Three - Second Street Option and Five - Second Street Option) would change the street-level characteristics at its touchdown point (adjacent to the Second Street/Stillman Street intersection) when compared to pre-earthquake and existing conditions. At this location, Second Street has two travel lanes in each direction, Stillman Street has one eastbound travel lane, and sidewalks and on-street parking are provided throughout the area. The new off-ramp would be located adjacent to existing transportation facilities, replacing existing on-street parking, off-street parking, and a 22.8 meter (75 Foot) segment of the Stillman Street sidewalk with an off-ramp; the new off-ramp would otherwise not affect existing street-level characteristics. While traffic volumes would increase at this location by as much as 570 vehicle trips/hour as a result of the new off-ramp, the traffic analysis performed for this project finds that increased congestion would not occur. Due to its proposed location, the new off-ramp would not divide an established community, since it would have a subordinate influence on the area compared to the existing I-80 freeway overpass, but it would introduce a new transportation facility into an area with residential uses. Nearby South Park would not be diminished as a community focal point in this area, but would experience increased traffic activity on its narrow streets.

Under the Fourth Street Option of Alternatives Three and Five, modifications to the existing Fourth Street I-80 eastbound off-ramp would occur. This modification, which would include widening the mainline freeway between Sixth Street and Fourth Street to provide an additional exclusive lane onto the Fourth Street off-ramp, would be adjacent to existing transportation facilities and would therefore not divide or disrupt the fabric of an existing neighborhood when compared to pre-earthquake or existing conditions.

Davis Street Area

Under Alternatives Three and Five, Davis Street would be reopened to automobile traffic between Washington and Clay Streets, providing two southbound lanes. Prior to demolition of the Embarcadero Freeway and under current conditions, Davis Street is a mapped but unimproved street which is used as a pedestrian walkway connecting Washington and Clay Streets. This walkway is used to bypass streets when traveling between The Embarcadero Center, Golden Gateway and the Jackson Square areas. Reopening this portion of Davis Street to vehicles would not affect the continued use of the street for pedestrians, since the re-opened Davis Street would have full pedestrian access, and the pedestrian bridge between Maritime Plaza and Block 203 would remain.

4.6.2 COMMUNITY AND BUSINESS ACCESS

There are several dominant travel patterns which pose the greatest potential for change and potential socioeconomic effects: (1) vehicle travel along the north-south Embarcadero corridor, including vehicle access to Port facilities along the waterfront; (2) pedestrian and bicycle travel across The Embarcadero corridor (in an east-west direction) to and from the ferry landing areas and to and from the various community features, businesses and restaurants occurring along the eastern waterfront; (3) vehicle travel from the U.S. 101/I-80 to downtown San Francisco and on inbound local streets (e.g., Market, Mission and Folsom Streets); and (4) vehicle travel from downtown San Francisco to U.S. 101/I-80 and on outbound local streets (e.g., Market, Mission, Howard, and Harrison Streets).

Section 4.5 discusses the potential traffic impacts at local intersections, changes in traffic operations, and other transportation-related impacts of the project alternatives. Project alternatives would shift demand on local streets throughout the system, resulting in degraded intersection levels of service and increased vehicle queuing in some locations.

When compared to pre-earthquake conditions, none of the project alternatives would restore the direct freeway access lost as a result of the earthquake, since none would restore the Embarcadero Freeway and the TSS, which combined to provide a direct connection between the regional freeway system and neighborhoods north of downtown. As explained in Section 3.4.2, the change in access since the earthquake has increased average travel times by an estimated three to five minutes, and has been blamed by some people for a drop-off in business revenues in Chinatown, North Beach, and Fisherman's Wharf. Not all tourist-serving businesses and attractions have lost revenues, and some people blame the nationwide recession rather than the earthquake for declines. Another theory is that there is a perception that access to these areas has substantially deteriorated, in spite of the minor change in average travel time to these areas resulting from freeway removal.

The potential economic impacts of not rebuilding the freeway are fairly speculative -- although, in general, the effect would be to perpetuate existing conditions. Potential effects would be reduced to the extent that the build alternatives would facilitate access to areas north of downtown via planned ramps and surface street improvements. Potential effects would also continue to be reduced to the extent that people use directional signs installed since the earthquake to find their way to Chinatown, North Beach, and Fisherman's Wharf. It is also possible that any build alternative could change peoples perceptions about access.

None of the proposed roadway and ramp features would divide or run through minority or low income neighborhoods, and no residents would be displaced. Executive Order 12898 of February 11, 1994 requires federal agencies to “make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” While some people blame the earthquake for economic impacts on ethnically and culturally-defined neighborhoods including Chinatown and North Beach, no project-specific "adverse human health or environmental effects" have been identified which would disproportionately affect those neighborhoods. (See Unavoidable Adverse Effects discussion, pp. 470-473.) There are no other identified areas in the project vicinity, with a high minority or low-income population, that would be disproportionately impacted by the proposed project. In the absence of substantial changes to the street network, projected changes to congestion points and queuing would not substantially change access to community facilities or businesses in the downtown area; or change emergency vehicle access.

Under all build alternatives, pedestrian access across the Embarcadero roadway would be improved over existing and pre-earthquake conditions by improved paving and signal timing. Access for persons with disabilities would be improved, since new pedestrian facilities (including intersections, crosswalks and sidewalks) would be designed pursuant to requirements set forth in the Americans with Disabilities Act (ADA). In addition, all build alternatives would accommodate other planned projects in the area (described in Section 2.4), which themselves are intended to improve community or business access along the waterfront.

4.6.3 BUSINESS DISPLACEMENT

Two types of business displacements would occur under all of the build alternatives: (1) displacement of the Saturday Farmer's Market, located on the Embarcadero roadway median on Saturdays; and (2) displacement of on-street and off-street parking spaces under the jurisdiction of the Port of San Francisco. The displacement of Port parking spaces would result in some loss of revenue to the Port, which would in and of itself constitute a business displacement. There is no evidence that the loss of parking would necessarily cause business displacements other than this direct loss of revenue. These potential direct and indirect economic impacts of Port parking displacement are discussed further in Section 4.6.6 of this report.

In addition to these two types of business displacement common to all build alternatives, Alternatives Three, Four and Five would also displace off-street parking in lots owned by Caltrans and leased to private operators. The specific locations of these lots are all south of Howard Street where there is unused off-street parking capacity, and are described in Section 4.5.3 of this report.

The Saturday Farmer's Market was established on September 12, 1992 in the Embarcadero roadway median in front of the north flank of the Ferry Building. The market brings together members of the Bay Area farming community and local residents. Beginning on May 22, 1993 and continuing to the present, the market operates on Saturday mornings from 9:00 a.m. to 2:00 p.m. During weekdays, the 60,000-square-foot (5,574-square-meter) area used by the market is leased out by the Port of San Francisco for parking. The market has operated under 90-day temporary use permits issued by the Port and 60-day temporary use permits issued by the City, pays the Port an annual users fee and collects weekly stall fees from its vendors. The long-term goal of the market has been to find a permanent location. The Marketing Coordinator has stated that relocation sites being considered include Assessor Block 202 (southwest corner of The Embarcadero and Washington Street), and the ground floor of the Ferry Building.

Under all build alternatives the area occupied by the market would be modified to accommodate the realigned roadway and the MUNI F-Line, and the market would be displaced. Public Law 91-646, Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 established "a uniform policy for fair and equitable treatment of persons displaced as a result of federal or federally assisted programs in order that such persons shall not suffer disproportionate injuries as a result of programs designed for the benefit of the public as a whole." All rights and services provided under this law will be strictly adhered to.

Based on the operating characteristics of the Saturday Farmer's Market, it appears that suitable relocation sites may be available within the Mid-Embarcadero area. These include the Ferry Plaza (alone or in combination with a portion of the ground level of the Ferry Building), Pier 30-32, Pier 3, and/or a portion of Assessor Block 202.

4.6.4 POPULATION AND EMPLOYMENT

Table 4.6-1 estimates the number of jobs and level of economic activity created by the expenditure of construction funds on the proposed project. Funds created in economic output include the multiplier effect of a dollar of direct highway construction being re-spent in service or other sectors of the economy. These economic benefits would occur within the San Francisco Bay Area, and would follow the labor and material markets for highway construction.

With respect to job creation, FHWA found nationally in the early 1980s that a one-million dollar investment would directly generate 10 on-site, full-time construction jobs. When off-site, construction related, and service industry related jobs and related increases in consumer demand (direct, indirect, and induced effects) are considered, the total number of jobs created rises to about 23 for each one million dollar investment. If inflation is considered, this is approximately the result found by the Bureau of Labor Statistics in the middle 1970s using an inter-industry input-output model to determine the employment impact of highway construction.

There are also monetary savings that the region would realize from improvement in operating efficiency, mobility and safety of vehicular travel. Improvements in operating efficiency include such user benefits as savings in fuel, oil, tire, repair and maintenance, and depreciation.

There are also monetary savings that the region would realize from improvement in operating efficiency, mobility and safety of vehicular travel. Improvements in operating efficiency include such user benefits as savings in fuel, oil, tire, repair and maintenance, and depreciation; mobility savings include travel time savings; and safety savings include reduction in property damage and fatal and injury accidents. These figures give order of magnitude results for project construction based on current construction cost estimates.

The proposed project would be growth inducing if the amount of employment growth in San Francisco that would take place with an alternative is greater than the amount that would take place if no action is taken. This topic is discussed in Section 4.16.

TABLE 4.6-1
ESTIMATED ECONOMIC AND EMPLOYMENT BENEFITS FROM CONSTRUCTION INVESTMENT

				Job Creation (Persons)	
Alternative	**Construction Value**	**Regional Economic Output**	**Total Earnings**	**On Site**	**Total**
Alternative 2	$62 million	$108.59 million	$28.4 million	620	1,430
Alternative 3a	$102 million	$178.5 million	$46.7 million	1,020	2,340
Alternative 3b	$101 million	$176.8 million	$46.3 million	1,010	2,320
Alternative 4	$68 Million	$119.0 million	$31.1 million	680	1,560
Alternative 5a	$103 million	$180.3 million	$47.2 million	1,030	2,370
Alternative 5b	$102 million	$178.5 million	$46.7 million	1,020	2,340

Sources: San Francisco Department of Public Works; Public Affairs Management, 1994.

A.L. Poliano and Carol Roadifer,REIMHS: A Prototype Model for Regional Economic Analysis of Highway Projects and Systems, Federal Highway Administration, presented at TRB 68th Annual Meeting, Washington, D.C., January 1989.

4.6.5 PUBLIC FACILITIES AND SERVICES

The proposed project would not adversely affect fire and police protection, schools, childcare, libraries, or medical facilities in the study area since no residential relocations would occur, growth would not be induced, and access and circulation within and through the study area would not be substantially reduced.

The Draft Section 4(f) Evaluation for the proposed project, prepared pursuant to Section 4(f) of the Department of Transportation Act of 1966, contained at the back of this EIS/EIR, evaluates the potential use by the project of publicly-owned land from a public park, recreation area or wildlife refuge of national, state or local significance, or any land from a historic site of national, state or local significance. As identified in the Draft Section 4(f) Evaluation, only Alternative Five would result in permanent use of an existing Section 4(f) resource. Portions of Justin Herman Plaza would be permanently used to accommodate the realignment of the southbound Embarcadero lanes. Avoidance of this impact is discussed on p. 228.

Public facilities in the study area include highways (U.S. 101, I-80 and prior to the earthquake State Route 480), the Bay Bridge and local streets, and local and regional transit and ferry services. The operational characteristics of these facilities would be variously affected by the proposed project, including intersection levels of service, travel speeds, vehicle queues, travel times, and system balance. These potential physical effects are discussed in Section 4.5.

None of the physical changes proposed for area transportation systems as part of the build alternatives would have long term economic effects, except that extension of the 83-Pacific bus route (if implemented) would increase MUNI's annual operating costs by approximately $135,000, requiring additional funds or a shift in resources from other services.

4.6.6 PARKING DISPLACEMENT

Tables 4.6-2 and 4.6-3 describe the change in Port parking resources in terms of the location and type of parking, respectively. Table 4.6-2 describes the Port's parking supply at three locations: the off-street Embarcadero median; the off-street Ferry Building entrance; and the on-street locations between Broadway and Folsom Street. Table 4.6-3 describes impacts on Port parking in terms of the duration of parking offered -- short-term (hourly or less) and long-term (daily through permits). The 79 spaces at the Ferry Building entrance and 100 of the 344 total

Table 4.6-2
Changes In Port Parking By Alternative
(Compared to Existing)

Location	Embarcadero Median	Ferry Building Entrance	Broadway to Howard Street*	Total
Alternate 1				
Off-Street	0	0	0	0
On-Street	0	0	0	0
Alternate 2				
Off-Street	(344)	(79)	-	(423)
On-Street	-	-	52	52
Alternate 3A				
Off-Street	(344)	(79)	-	(423)
On-Street	-	-	81	81
Alternate 3B				
Off-Street	(344)	(79)	-	(423)
On-Street	-	-	81	81
Alternate 4				
Off-Street	(344)	(79)	-	(423)
On-Street	-	-	52	52
Alternate 5A				
Off-Street	(344)	(79)	-	(423)
On-Street	-	-	84	84
Alternate 5B				
Off-Street	(344)	(79)	-	(423)
On-Street	-	-	84	84

* New on-street parking on Embarcadero between Broadway and Howard Street would be for off-peak only.
Source: Douglas Wright Consulting, Port of San Francisco

Table 4.6-3
Project Impacts to Port of San Francisco Parking Supply by Alternative

Change in Parking Supply	Alternative 1	Alternative 2	Alternative 3A	Alternative 3B	Alternative 4	Alternative 5A	Alternative 5B
Long-term spaces lost to project	0	244	244	244	244	244	244
Long-term spaces lost to MUNI F-Line	0	0	0	0	0	0	0
Total loss of long-term spaces	**0**	**244**	**244**	**244**	**244**	**244**	**244**
Short-term spaces lost	0	314	314	314	314	314	314
Short term-spaces added	0	187	216	216	187	219	219
Net loss of Short-term spaces	**0**	**127**	**98**	**98**	**127**	**95**	**95**
Total Net Loss	**0**	**371**	**342**	**342**	**371**	**339**	**339**

Baseline: 1992/93 Supply
Source: Douglas Wright Consulting

spaces in the Embarcadero median are described as short-term since that is how they are managed by the Port. All on-street spaces are short-term.

Under the build alternatives, between 339 and 371 existing short-term and long-term parking spaces owned and operated by the Port would be permanently displaced (see Table 4.6-3). In and of itself, this parking displacement would not constitute a substantial environmental impact given the present and future parking supply within walking distance of The Embarcadero. Nonetheless, this parking displacement would have an economic impact by reducing annual revenues received by the Port. Prior to the earthquake, parking revenues, which in 1992-93 totaled approximately $1,415,000, represented over 10% of the Port's annual operating income.

As set forth in Table 4.6-3, a net gain of on-street parking spaces would occur under all build alternatives. These estimates assume that on-street parking would be permitted during non-peak hours on both sides of The Embarcadero from Broadway to Howard Street. The exceptions to this would be on the northbound lanes between Howard Street and Pier 1, and at Pier 7, where policies of the Bay Conservation and Development Commission (BCDC) would discourage on-street parking. Consequently, the build alternatives would provide a parking benefit of an increased supply of short-term on-street spaces, but these spaces would be available only during the non-peak hours. Although it is impossible to estimate accurately the economic impact of this upon the Port, the over-all impact is probably negligible since the increased supply of spaces available would be balanced by the limitation on on-street parking during peak periods.

In contrast to the net increase in off-peak on-street spaces, off-street parking losses affected by the build alternatives would directly impact the Port's revenues. Based on past levels, the loss in revenue would likely represent more than 5% of the Port's annual operating income.

Businesses that lease parking would be affected by the removal of leasable parking spaces from the median of The Embarcadero. These businesses - both Port tenants and non-tenants - would be forced either to rent spaces at alternative locations (presumably at a higher cost per month) or to relinquish long-term parking spaces altogether. In choosing the latter option, they would be requiring both employees and customers/clients who currently use the leased spaces either to arrange and pay for their own parking or to use alternate modes of transportation. Policies and objectives of the Transportation Element of the San Francisco Master Plan would tend to encourage the shift to other modes of transportation.

Destination restaurants near the Ferry Building lease parking spaces not necessarily for employees, but primarily for patrons. Their operations typically include valet parking, and the leased spaces provide nearby storage for patrons' cars. At the present time, however, the only use of median parking for this purpose is as a temporary replacement for leased parking at the Agriculture Building, which is unavailable during the current Ferry Building renovation due to construction activities. If the temporary use of the median spaces ends before the implementation of the proposed project, this business will not be affected by the removal of parking spaces in the median, except insofar as restaurant patrons choose to ignore the valet parking option and park their cars in the vicinity, or insofar as the valets use vacant median spaces as informal "overflow".

Businesses that rely on the convenience of nearby parking for their customers and clients could be affected by the removal of short-term parking from The Embarcadero, including the metered spaces in front of the Ferry Building. Clients and customers of the businesses could be inconvenienced and could be forced to park further from their destinations or switch to transit. For some businesses, the inconvenience to clients and customers might result in loss of some of their client base. If access to convenient short-term parking, and therefore, patronage were to decrease by more than some threshold amount, these businesses might move or, at least, be unwilling to pay the same amount of rent as they currently pay when their leases expire.[33]

Other businesses, which require parking to be available to short-term visitors who come for pre-arranged meetings, would also be affected by the removal of short-term parking in front of the Ferry Building. If the existing metered spaces in front of the Ferry Building and World Trade Center were removed, visitors would have to park along the curb or enter parking lots farther away, possibly in Embarcadero Center. The convenience of the Ferry Building/World Trade Center/Agriculture Building location (in terms of client accommodation) would be reduced for the Port tenants. For firms that do not cater to short-term visitors, the inconveniences caused by parking removal would be unlikely to affect overall business performance or business location decisions.

Businesses that rely on short-term parking for employees who spend only a short time in the office before or after visiting field locations would experience a change in their patterns of business operations with the removal of short-term parking, but the magnitude of the changes would depend on the time of day at which their employees visit the home office. If these workers had to park several blocks away, the amount of time required to visit the mid-Embarcadero office (that is, the time it takes to walk between the car and the office) could increase to twice or more the time currently required.

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[33] Their negotiating positions on the amount of rent they are willing to pay would be affected by a variety of factors not limited to parking availability. For example, the availability of comparable space, or space with a comparable package of amenities, in other locations, would be another important factor, as would transit accessibility and other advantages of their current location.

Some businesses use the existing metered spaces in front of the Ferry Building not only for short-term parking but also for loading. For loading operations, proximity of these spaces is imperative. Under all build alternatives, the loading function would be relocated between 36 and 49 meters (120-160 feet) to the west, and would occur along the curb (in off-peak periods) and/or in loading/transit bays provided in front of the Ferry Building.

Of the 193 spaces currently available for long-term lease in the median of The Embarcadero, 44 (23 per cent) are leased by Port tenants, 49 (25 per cent) by companies that are not Port tenants, and 74 (38 per cent) by individuals. Twenty-six spaces (13 per cent) are classified by the Port as vacant. Fifty-three of the 139 mid-Embarcadero Port tenants lease at least one parking space; 17 tenants lease at least one space in the median of The Embarcadero.[34]

Firms that lease parking spaces in the median of The Embarcadero tend to occupy only one or two spaces; 34 firms lease a total of 93 spaces. Only four Port tenants lease more than three spaces. Two firms that are not Port tenants occupy the greatest number of spaces: one leases 10 and the other leases 18 spaces.

The June 1994 survey sought to identify the characteristics and behavior of people who park in both short-term and long-term spaces found in the focused parking study area. Recorded were the survey responses of 416 people parking in 15 off-street parking facilities in the focused study area.[35]

The respondents included 58 people parking near the Ferry Building ("Mid-Embarcadero parkers") who were interviewed as they left or returned to their vehicles. They are given particular emphasis in this analysis because it is the spaces they were using that would be most affected by the project.

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[34] For more details regarding current uses of Port managed parking, please see the Land Use/Socio-economic/Growth Inducement Background Report. A copy of this report is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

[35] The Survey was conducted by interviews at 15 locations between 7 AM and 5 PM on June 7-9, 1994. The 15 off-street locations included the 79 metered spaces in front of the Ferry Building as one of those facilities. Survey was accomplished by Pittman & Hanes Associates.

Of the 58 Mid-Embarcadero parkers interviewed, 51 (88 per cent) reported the purpose of their trip to be "work". This proportion compares with 93 per cent for the 416 parkers in the full survey. Of the non-working Mid-Embarcadero parkers, six indicated their trip purpose as "recreation" and one as "other" (that person was en route to the Amtrak office in the Ferry Building). Compared to the full complement of 416 parkers, the Mid-Embarcadero parkers were more likely to be making recreational trips - ten per cent indicated recreation as the purpose of their trip, as compared with only three per cent of those surveyed who were parking elsewhere in the study area. All the Mid-Embarcadero parkers making recreational trips parked in The Embarcadero median (six of the 30 parkers interviewed there indicated they were on recreational trips).

The largest single group of Mid-Embarcadero parkers nevertheless consists of people who have driven to work from homes in San Francisco in one- or two-occupant vehicles. Twenty-five per cent (15) of the 58 people interviewed fell into this group, including six of the 30 who parked in The Embarcadero median, and two of the seven who parked at the Ferry Building meters.

The destinations of the parkers were generally in the immediate area: 14 were headed for the Ferry Building or the Agricultural Building; eight for One Market Plaza; ten for Embarcadero Center or California Street addresses; seven for nearby parts of the South of Market (the area around Steuart, Spear, Mission, and Howard Streets); and five for the Financial District. Of the remaining 14 respondents, 12 gave their destination as "work" rather than a specific location, while two recreational travelers indicated Alcatraz and Coit Tower as their destinations. The other four recreational parkers, all interviewed in the evening, were going to the Ferry Building (possibly dining at the World Trade Club).

Looking at destinations in terms of distance from the parking location, 36 of the 58 Mid-Embarcadero parkers reported they were parking a block away (or less) from their destinations. Another ten were two or three blocks away, and nine were four or five blocks away. Three were more than five blocks away (including the respondent headed for Coit Tower), and two were destined for Montgomery Street locations.

For the most part, the respondents regularly park at the locations at which they were surveyed. Of the 58 Mid-Embarcadero parkers, 49 (84 percent) indicated that they park at least once a week in the locations where they were parking at the time of the interview. This compared with 77 per cent of the full interview sample of 416. Three more of the 58 respondents indicated that they park at that location at least once a month, and another three less than once a month but more than once a year.

Indirect economic losses to the Port associated with parking displacement could result for several reasons. First, the area currently used by the Saturday morning Farmer's Market in the median of The Embarcadero, would no longer be available for that use. If the Farmer's Market operation could not be replaced on another site in the vicinity, then the Port would lose parking revenues generated by the patrons of the Market. (See p. 365 for a discussion of the Market itself.)

Port lease revenues could be negatively affected by the current project if patronage of Port tenants declines as a result of parking removal; lease revenues would remain the same despite parking removal if patronage remains constant due to planned transit and pedestrian improvements. Retail leases are often structured such that the tenants pay a fixed minimum rent plus a percentage of their revenues over a specified threshold. If the tenant revenues decline - for example, because the removal of short-term parking has made it more difficult for potential customers to reach them - then the percentage rents paid to the Port would decline as well. Alternatively, if tenant revenues remain the same, then the percentage rents paid to the Port would remain the same.

Similarly, Port lease revenues could be negatively affected by the current project if Port facilities become less desirable for tenants due to parking displacement; lease revenues would remain the same if facilities remain desirable due to increased transit accessibility and pedestrian improvements. Reasons for reduced desirability include potential inconvenience to workers, customers and clients, as well as a likely increase in the cost of leased parking to replace spaces currently leased in the median of The Embarcadero. While businesses must consider a variety of factors as they choose one location over another, parking convenience and cost is one of those factors and could lead some existing tenants either to seek reduced rents (to compensate for higher parking costs) when their current leases expire, or to move to another space (for example, in the less intensively developed areas south of Market Street). Similarly, businesses that are not currently Port tenants but that consider the Mid-Embarcadero Port facilities as one location option when their current leases elsewhere expire are likely to consider parking availability among the factors that determine their locational decisions. Depending on the variety and characteristics of competing business locations, the Port could see its rental income decline - in the form of either lower obtainable rents or increased vacancies - if nearby long-term and/or short-term parking is removed. The future "developability" or attractiveness of nearby Port properties to potential future tenants could also decline. Conversely, the Port's rental income could remain the same, along with the attractiveness of Port properties to potential future tenants, if locational decisions are based more on factors other than parking, such as the waterfront location and transit accessibility.

Compensation for Port Revenue Loss

There are two obvious ways to compensate the Port for the loss of parking revenue: monetary compensation for the value of the business use displaced, or replacement of the parking spaces. Since replacement of the parking spaces would also lessen any inconveniences caused to Port tenants and other users of the parking areas that would be displaced, a replacement parking facility was investigated further. Such a facility, or facilities, would necessarily have to be: (1) off-street, since no on-street parking opportunities exist; (2) jointly or solely Port-managed in order that the revenues generated by the parking provide the compensation needed; and (3) within reasonable proximity to the Ferry Building so that the new supply is reasonably comparable to that which was displaced.

In surveying the Ferry Building vicinity for possible off-street parking facility sites, few opportunities present themselves. Since the policies of the Bay Conservation and Development Commission prohibit parking on Port piers, it is necessary to examine other locations, all of which are either already commercially developed or are in use as open space. Although open space locations present an opportunity for underground parking, in the Ferry Building vicinity most sites are precluded from consideration due to the subway facilities of the Municipal Railway and BART which lie beneath the open space generally bounded by Steuart Street, Mission Street, The Embarcadero, and Market Street, and the existing fountain and adjacent pedestrian plaza at Justin Herman Plaza. Consequently, the only potential site for a new off-street parking facility west of the Ferry Building and south of Clay Street, is the parcel owned by the San Francisco Municipal Railway at the northeast corner of Steuart and Mission Streets. However, the Municipal Railway has indicated that the site is unavailable since it will continue to be needed as a MUNI bus layover facility.

North of Justin Herman Plaza are two opportunity sites for an off-street parking facility, Assessor's Blocks 202 and 203 (see Figure 4.6-1). Portions of both blocks served as the right-of-way for the Embarcadero Freeway structure, prior to its demolition. Of the two, Block 202 is a much better candidate for providing an off-street parking site, because Block 203 is more distant from the Ferry Building when compared to the existing Embarcadero median parking (or when compared with parking developed in conjunction with other downtown commercial buildings). Also, although currently used as open space, it is possible that the Block 203 would be rezoned for commercial development. Block 202 is in closer proximity to the Ferry Building, offering the opportunity for pedestrian portals to be located immediately across The Embarcadero from the Ferry Building. Although it is possible that some portion of the Block may be rezoned for development, underground parking could be a shared resource for that development and Port properties.

As required by Federal right-of-way rules, the project would compensate the Port for revenue loss due to parking displacement, either through construction of an underground parking structure of up to 340 spaces beneath Block 202 and adjacent portions of Washington Street, or by direct monetary compensation.

Given funding, a garage could be built under all build alternatives, although the curved Embarcadero alignment under Alternative Five would mean a slight modification, with a loss of a small number of parking spaces[36]. Above-ground ramps and pedestrian stairs and elevators would be required to access the garage, and would be sited to avoid park property.

The traffic and pedestrian analyses presented in Sections 4.5.1 and 4.5.5, respectively, consider potential future increases in traffic and pedestrian volumes generated by the proposed garage. Manual traffic assignments assumed up to 600 parking spaces on Block 202. Sections 4.14 and 4.15 discuss potential impacts and mitigation measures related to hazardous materials and archaeological resources that could be encountered during construction of a one or two-level subsurface garage. No additional environmental analysis would therefore be required unless its design was substantially different from that described here.

Construction of the garage would require approval of the City's Recreation and Park Commission, which has jurisdiction over a portion of Block 202. The garage would also require

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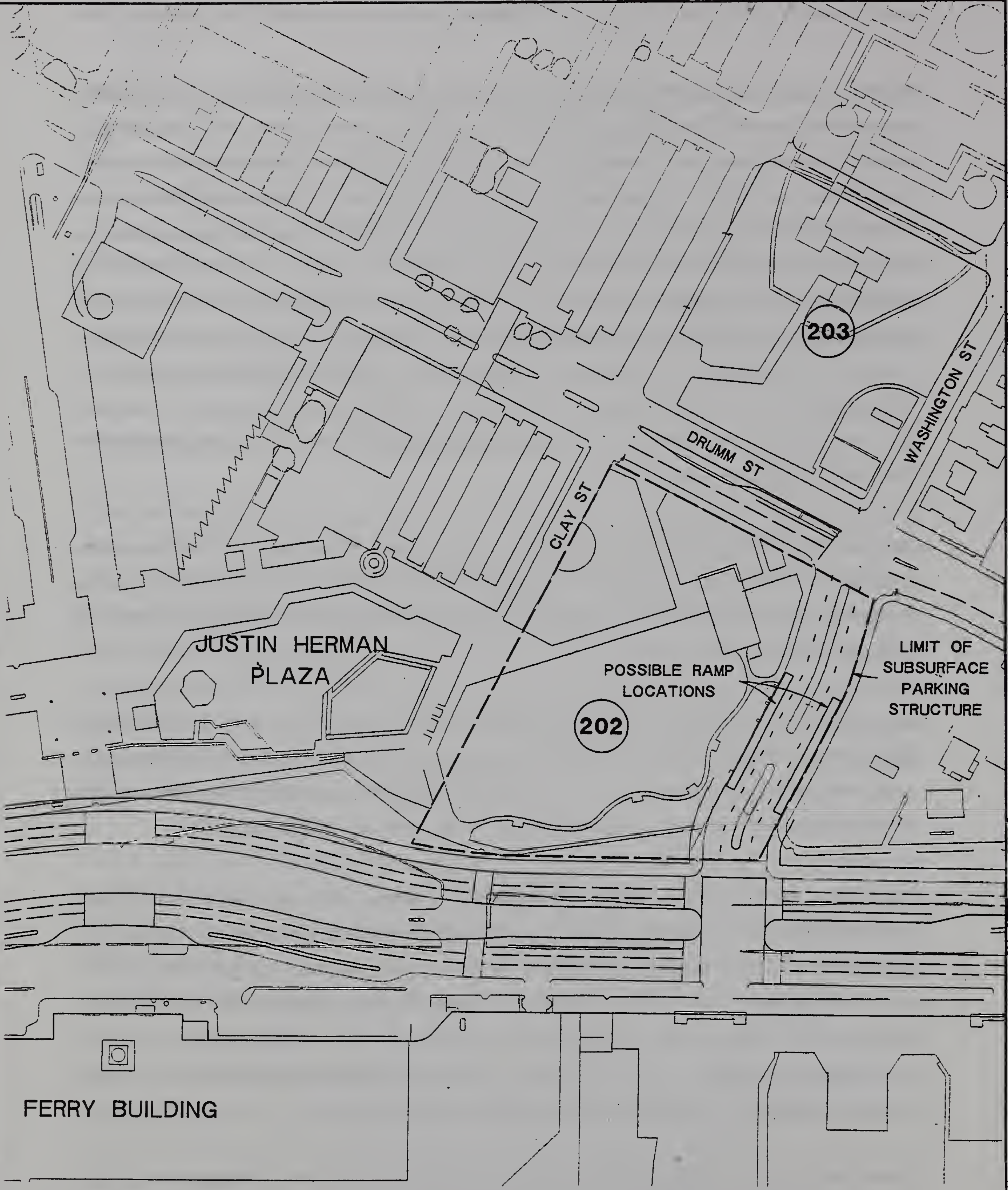
[36] Right-of-way costs, including construction of an underground parking structure, are estimated at $25 to 35 million.



Source: Douglas Wright Consulting

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator	Potential Subsurface Parking Site on Assessor's Block 202	Figure 4.6-1

amendment of the San Francisco Master Plan by the City Planning Commission to permit parking under a park. The City Charter would require the revenues derived from parking under park property to be credited to the Recreation and Park Department. Revenues from other portions would be credited to the Port of San Francisco. Also, construction of the garage would require amending the Golden Gateway Redevelopment Plan to establish parking as an authorized or alternative use for the site.

4.6.7 CONSTRUCTION PERIOD IMPACTS

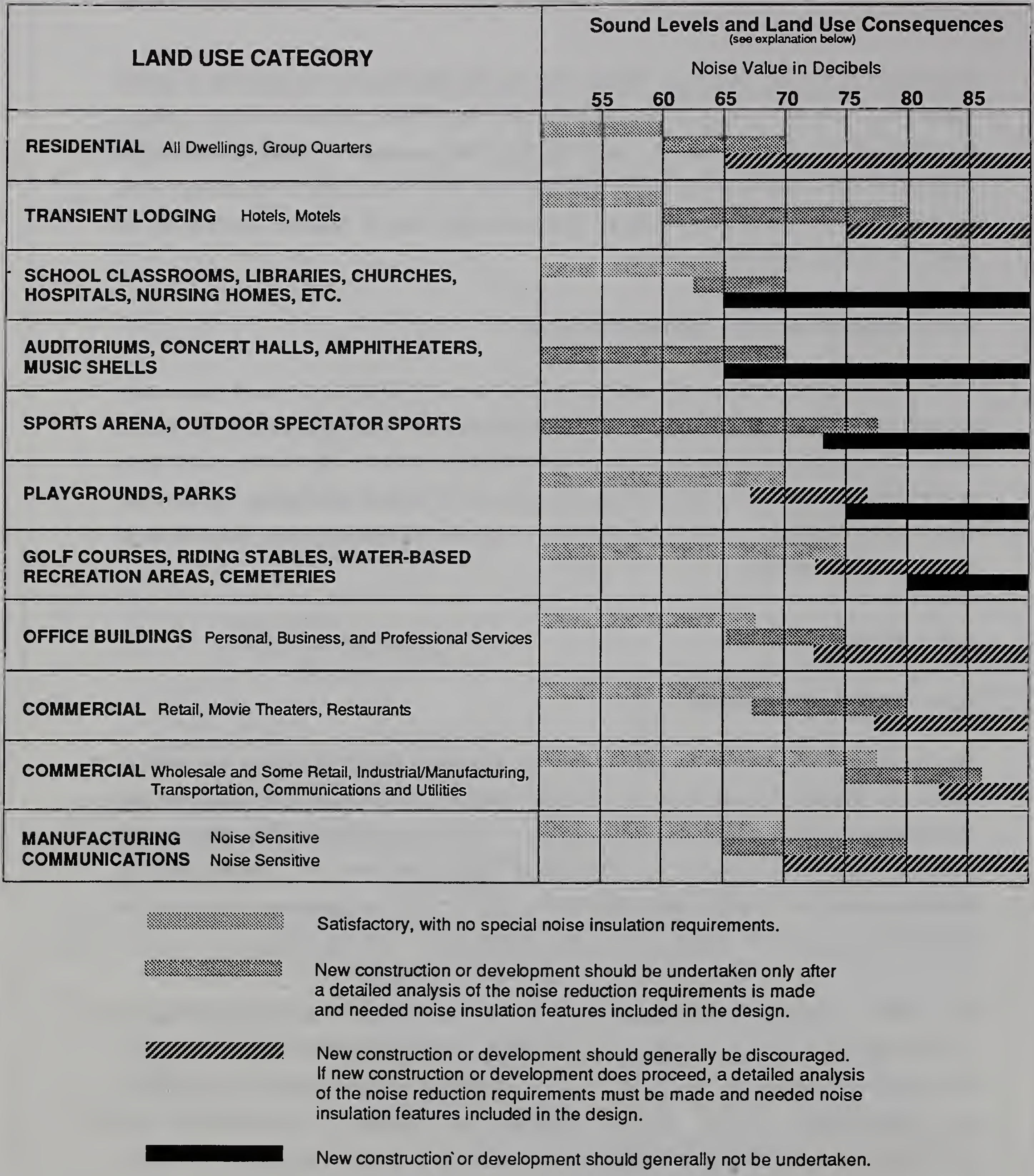
Construction impacts on the socio-economic environment of the project area would occur under all build alternatives. These impacts would include elevated noise and dust levels, loss of parking, and changes in vehicular and pedestrian circulation patterns. No existing public open spaces would be used for construction staging under any of the build alternatives. Construction impacts and mitigations related to transportation, noise and dust are discussed respectively in Sections 4.5, 4.7, and 4.8.

4.7 NOISE

4.7.1 NOISE STANDARDS

The Environmental Protection Element of the San Francisco Master Plan cites the need to reduce the impact of noise from transportation sources and promote land uses that are compatible with various transportation noise levels. The Element contains land use compatibility guidelines (specified in terms of L_{dn}) which are indicated in Figure 4.7-1, and are the local standards which have been adopted to determine planning policy regarding land use so as to reduce the effects of noise on current and future inhabitants.

The Federal Highway Administration (FHWA) and the California State Department of Transportation (Caltrans) have highway noise abatement criteria specified in terms of the peak hour L_{eq} noise from motor vehicle traffic. The FHWA/Caltrans criteria are based on various land use characterizations (called "activity categories") as indicated in Table 4.7-1. The FHWA/Caltrans noise criteria are primarily used to evaluate noise levels for outdoor areas with frequent use (e.g., backyards of residences, parks, school playgrounds). It is FHWA and Caltrans policy to consider noise abatement for roadway projects that result in noise levels at sensitive receptors that "approach" or exceed the FHWA/Caltrans criteria.



░ Satisfactory, with no special noise insulation requirements.

▒ New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

▨ New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

■ New construction or development should generally not be undertaken.

Source: City and County of San Francisco Environmental Protection Element, 1974

Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	**Land Use Compatability Chart for Community Noise**	**Figure 4.7-1**

TABLE 4.7-1

FHWA NOISE ABATEMENT CRITERIA[1]

Activity Category	$L_{eq}(h)$[2]	$L_{10}(h)$	Description of Activity Category
A	57	60	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	---	---	Undeveloped Lands
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: Federal Highway Administration 1982.

[1] Either $L_{10}(h)$ or $L_{eq}(h)$ (but not both) may be used on a project.

[2] Hourly A-weighted Sound Level for the noisiest hour of the day in the design year.

4.7.2 OPERATIONAL NOISE

Community ambient noise levels can increase due to an increase in local traffic volume (either by improved traffic flow or addition of new lanes), an increase in traffic speed, movement of existing roadways closer to receptors through realignment, or construction of new freeway ramps. Changes in the composition of motor vehicle traffic (i.e., the proportion of trucks to automobiles) can also affect the amount of noise generated from roadways, thereby affecting the ambient noise environment. Where other factors remain constant, a doubling of traffic normally results in an increase at nearby locations of 3 dBA, which is generally considered to be the amount of change necessary to result in a "perceptible" difference to the average person. Whereas, a decrease in ambient traffic noise of 10 dBA is usually perceived as a halving of the loudness.

To determine the effect of the proposed roadway alternatives on the long-term ambient noise environment, noise levels at noise sensitive receptors identified in Section 3.5 were determined using standard traffic noise models (i.e., the computer program SOUND32). The future operational noise levels at sensitive receptors for each project alternative were calculated based on the proposed alternative roadway designs and predicted traffic conditions for the project design year 2015. Traffic data used in the project operational noise impact analysis includes traffic associated with project development as well as general traffic growth in the region.

In the 2015 future context (i.e., under the No Build Alternative), for almost all of the receptors, there would be very little change from the existing ambient noise levels because there would not be a substantial difference between the existing traffic condition and the predicted future traffic condition. In general, the future noise environment in the noise study area would be an improvement when compared to the pre-earthquake environment, especially along The Embarcadero, and would remain nearly the same elsewhere in the study area. Table 4.7-2 indicates the peak hour L_{eq} for the receptors with frequent outdoor use and Table 4.7-3 indicates the average L_{dn} for all receptors. Receptor locations are shown in Figure 3.5-1.

The future noise level for several outdoor receptors (Pier 7, Golden Gateway Tennis and Swim Club, Embarcadero Plaza North and South, the Promenade and Marin Day School and planned Rincon Point Park) would approach or exceed the FHWA/Caltrans noise criterion under the No Build Alternative.

TABLE 4.7-2

AVERAGE PEAK HOUR L_{eq} TRAFFIC NOISE LEVELS (dBA) FOR OUTDOOR AREAS

Receptor	Location	Pre-earthquake	Measured Existing	Alt 1	Alt 2	Alt 3A	Alt 3B	Alt 4	Alt 5A	Alt 5B	FHWA/ Caltrans Criteria
R-3	Pier 7	71	68	68	68	68	68	68	68	68	67
R-5A	Golden Gateway(1)	71	67	67	68	68	68	68	68	68	67
R-5B	·	70	65 *	65	66	66	66	66	66	66	67
R-7A	Maritime Park	73	60 *	61	62	62	62	62	62	62	67
R-7B	·	72	63 *	64	65	64	64	65	64	64	67
R-8A	Embarcadero Plaza (North)	72	66	66	67	67	67	67	67	67	67
R-8B	·	72	70 *	70	71	71	71	71	71	71	67
R-8C	·	72	66 *	66	67	67	67	67	67	67	67
R-9A	Justin Herman Plaza	71	62	63	63	64	64	64	64	64	67
R-9B	·	72	63 *	64	64	64	64	65	65	65	67
R-11	Embarcadero Plaza (South)	70	66	67	67	67	67	67	67	67	67
R-12A	Sidewalk near Promenade	76	74	75	75	75	75	75	75	75	67
R-12B	Promenade	74	70	71	69	69	69	69	69	69	67
R-16	Marin Day School	72	72	73	73	72	72	72	72	72	67

(1) Tennis and Swim Club

* Calculated from SOUND32 Model

Source: Wilson Ihrig and Associates

TABLE 4.7-3 AVERAGE L_{dn} TRAFFIC NOISE LEVELS (dBA)

Receptor	Location	Pre-Earthquake*	Measured Existing	Alt 1	Alt 2	Alt 3A	Alt 3B	Alt 4	Alt 5A	Alt 5B
R-1	Golden Gateway Commons III	72	72	72	72	72	72	72	72	72
R-2	Golden Gateway Commons II	78	72	75	75	75	75	75	75	75
R-3	Pier 7	72	69	69	69	69	69	69	69	69
R-4	Golden Gateway Center (West)	73	69	69	70	70	70	70	70	70
R-5A	Golden Gateway[(1)]	72	68	68	69	69	69	69	69	69
R-5B	"	71	66 *	66	67	67	67	67	67	67
R-6	Golden Gateway Center (East)	71	64	65	67	66	66	67	66	66
R-7A	Maritime Park	75	62 *	63	64	64	64	64	64	64
R-7B	"	72	63 *	64	65	64	64	65	64	64
R-8A	Embarcadero Plaza (North)	73	67	67	68	68	68	68	68	68
R-8B	"	75	73 *	73	74	74	74	74	74	74
R-8C	"	73	67 *	67	68	68	68	68	68	68
R-9A	Justin Herman Plaza	74	65	66	66	67	67	67	67	67
R-9B	"	76	67 *	68	68	68	68	69	69	69
R-10	Ferry Building	77	75	76	72	72	72	72	74	74
R-11	Embarcadero Plaza (South)	72	68	69	69	69	69	69	69	69
R-12A	Sidewalk near Promenade	77	75	76	76	76	76	76	76	76
R-12B	Promenade	75	71	72	70	70	70	70	70	70
R-13	Harbor Court Hotel	80	71 *	72	73	73	73	73	73	73
R-14	Rincon Towers	**	69	69	69	69	68	69	69	68
R-15	Hills Bros. Plaza	**	69	70	70	71	71	71	71	71
R-16	Marin Day School	**	74	75	75	74	74	74	74	74
R-17	Baycrest	**	76	77	77	76	76	76	76	76
R-18	Portside	**	76	77	77	77	76	77	77	76
R-19	Bayside Village (Bryant)	75	75	76	76	76	75	76	76	75
R-20	Bayside Village (Brannan)	72	72	73	73	73	73	73	73	73
R-21	Guy Place (Lower)	64	65	66	66	67	67	66	67	67
R-22	Guy Place (Upper)	§	69	69	70	70	70	70	70	70
R-23	355 Bryant	76	76	76	76	76	76	77	76	76
R-24	ClockTower	**	83	83	83	84	83	83	84	83
R-25	Apartments on Stillman St.	79	77	77	77	79	78	77	79	78
R-26	Hotel Utah	76	77	77	77	77	78	77	77	78

(1) Tennis and Swim Club * Calculated from SOUND32 model ** Construction completed after 1989 § Proposed

Source: Wilson Ihrig and Associates

Table 4.7-3 indicates the average Ldn for sensitive noise receptors. For many receptors there would be either no change under the No Build Alternative, or there would be a decrease in the ambient noise environment compared with pre-earthquake noise levels. Where changes would occur compared with the pre-earthquake environment, the difference ranges from a perceptible decrease (3 dBA) to a very noticeable decrease (12 dBA). Many receptors along the waterfront would experience a 5 to 8 dBA decrease compared with the pre-earthquake noise environment. Compared with the existing noise environment there would be little or no change except at the Golden Gateway Commons II (R-2). The future noise level at this receptor would increase 3 dBA at the corner of the complex closest to the intersection of The Embarcadero with Broadway due to modification of the roadway to conform with The Embarcadero north of Broadway and also due to an increase in traffic volume.

Based on the Land Use Compatibility Guidelines in the San Francisco Master Plan, the projected future noise levels for the planned Rincon Point Park under the No Build Alternative indicate that development of the park should be "generally discouraged" unless a detailed analysis of noise reduction requirements is made and the needed noise reduction features included in the design.

The differences among the build alternatives in terms of overall noise levels are small. Of the build alternatives, the Fourth Street Option of Alternative Three would result in the least overall increase in noise levels, when compared with the existing environment, and the Second Street Option of Alternative Five would result in the most overall increase in noise level so other alternatives would fall somewhere in between these two, and would vary one dBA or less in most locations.

The roadway improvements proposed under all build alternatives would generally increase noise levels about one dBA at receptors along the waterfront when compared with existing noise levels. Table 4.7-2 indicates the peak hour L_{eq} for the receptors with frequent outdoor use. For most of the receptors, there would be minor changes from the existing ambient noise levels because there are not substantial differences between the existing traffic condition and the predicted future traffic condition. The greatest change would be a two dBA increase in noise levels at Maritime Park (R-7A), Justin Herman Plaza (R-9A), and the Promenade (R-12B). (In general, a two dBA change would not be perceptible.) Consistent with existing conditions and the No Build Alternative, noise levels at many locations would exceed Caltrans/FHWA abatement criteria.

Table 4.7-3 indicates the average L_{dn} for receptors. For many receptors there would be either no change or a decrease in the ambient noise environment compared with pre-earthquake noise levels, but an increase with respect to the existing ambient noise environment.

Under all build alternatives, the greatest increase in noise due to traffic, compared with the existing ambient, would be for Golden Gateway Center -- East (R-6) and Golden Gateway Commons II (R-2) which would have a 2-3 dBA increase. (As stated above, a 3 dBA increase in ambient noise would generally be perceptible to most people.) The increase at Golden Gateway Commons II (R-2) would occur whether or not the current project is implemented and would result in noise levels 3 dBA less than those experienced prior to the earthquake.

The new off ramp proposed at the intersection of Second and Stillman Streets under the Second Street Option of Alternatives Three and Five would increase noise levels at nearby receptors (R-24 and R-25) by between one and two dBA when compared to existing noise levels (which are 83 and 77 dBA respectively). This one dBA increase would not be perceptible, and the noise environment of the area would continue to be dominated by the existing elevated I-80 freeway.

Modifications to the existing Fourth Street off-ramp proposed in the Fourth Street Option of Alternatives Three and Five would increase noise levels at nearby receptors (R-26) by one dBA when compared to existing noise levels (77 dBA). No sensitive receptors (e.g. residences, schools, parks) have been identified in the vicinity of the existing Fremont Street off-ramp, or at the location of the new on-ramp proposed in Alternatives Three and Five.

Reopening Davis Street to vehicular traffic between Clay and Washington Streets in Alternatives Three and Five would affect noise levels somewhat at receptors R-6, R-7A and R-7B in the area. Noise levels at these receptors would increase two to three dBA from existing noise levels, but would remain at or below levels anticipated under Alternatives Two and Four.

4.7.3 CUMULATIVE NOISE LEVELS

The cumulative noise levels at receptors that might be affected near The Embarcadero are indicated in Table 4.7-4. The cumulative noise levels incude motor vehicle traffic noise as well as noise generated by MUNI streetcars. Only L_{dn} noise levels are indicated because FHWA/Caltrans noise criteria are only applicable to motor vehicle noise and not the infrequent noise from streetcar trains.

TABLE 4.7-4

AVERAGE L_{dn} CUMULATIVE NOISE LEVELS (dBA)

Receptor	Location	Pre-Earthquake*	Measured Existing	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
R-2	Golden Gateway Commons II	78	72	74	75	75	75	75
R-3	Pier 7	72	69	70	70	70	70	70
R-5A	Golden Gateway(1)	72	68	70	71	71	71	71
R-8B	Embarcadero Plaza (North)	75	73	74	75	75	75	75
R-9A	Justin Herman Plaza	74	65	67	69	69	69	69
R-10	Ferry Building	77	75	76	72	72	72	75
R-11	Embarcadero Plaza (South)	72	68	72	72	72	72	71
R-12A	Sidewalk near Promenade	77	75	77	76	76	76	76
R-13	Harbor Court Hotel	80	71 *	72	73	73	73	73
R-15	Hills Bros. Plaza	**	69	70	70	71	71	71
R-18	Portside	**	76	77	77	77	77	77
R-20	Bayside Village (Brannan)	72	72	73	73	73	73	73

(1) Tennis and Swim Club ** Construction completed after 1989 * Calculated from model

NOTE: Only Receptors indicated would be affected by train noise from planned MUNI extensions along The Embarcadero; all other receptors are far enough away so not to be affected.

Source: Wilson Ihrig and Associates

The cumulative L_{dn} show a slight increase at most of the affected receptors over the project noise levels. Some receptors indicated would experience no change due to cumulative noise. The range of increase due to cumulative noise is no change to a 3 dBA increase. When compared with pre-earthquake noise levels, only two receptors (Embarcadero Plaza-South, under the No Build Alternative and Alternatives Two through Four, and the Promenade, under Alternative One, No Build) would have cumulative noise levels as high as the pre-earthquake levels. All other affected receptors would have cumulative noise levels lower than the pre-earthquake levels.[37]

4.7.4 CONSTRUCTION NOISE

Construction of the proposed project is expected to take between 20 and 21 months, and would involve the use of heavy equipment, jackhammers, and other noise-generating devices. Pile driving would be required for realignment of the Fremont Street off-ramp under Alternatives Three, Four and Five, construction of the I-80 on- and off-ramps within the I-80 right-of-way under Alternatives Three and Five, and construction of the underground garage on Block 202.

Construction noise is controlled by the San Francisco Noise Ordinance which sets a maximum limit of 80 dBA to be measured at 30 meters (100 feet) from the equipment or an equivalent sound level at some other convenient distance. Impact tools and equipment (e.g., jackhammers and pavement breakers) are exempted as long as they are equipped with intake and exhaust mufflers and acoustically attenuating shields or shrouds are used "as best accomplishing maximum noise attenuation."

In the waterfront area, the receptors that are likely to experience the greatest noise levels are the Golden Gateway Commons II, the Ferry Building, the Agriculture Building, the restaurant (which has an outdoor eating area) behind the Ferry Building, the commercial establishments along The Embarcadero south of Mission Street, and the Harbor Court Hotel in the same block. All of these receptors would be relatively close to construction. Away from the waterfront area, the receptors potentially affected by construction noise would be the Clock Tower and apartments on Stillman Street (under the Second Street Option of Alternatives Three and Five,) and the Hotel Utah (under the Fourth Street Option to Alternatives Three and Five).

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[37] For more detail regarding the noise study conducted for the project alternatives, please see the April 1995 Noise Background Report. A copy of this report is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

4.7.5 NOISE MITIGATION

The FHWA and Caltrans require that feasible noise abatement be considered where FHWA/Caltrans noise criteria are approached or exceeded, regardless of whether a substantial increase in noise levels would occur. Consistent with 23 CFR 772.5(h), noise abatement was not considered where project alternatives would not substantially change the horizontal alignment, vertical alignment, or number of lanes of the Embarcadero roadway or the mainline freeway.

Consistent with FHWA and Caltrans requirements, noise barriers were evaluated at three locations.

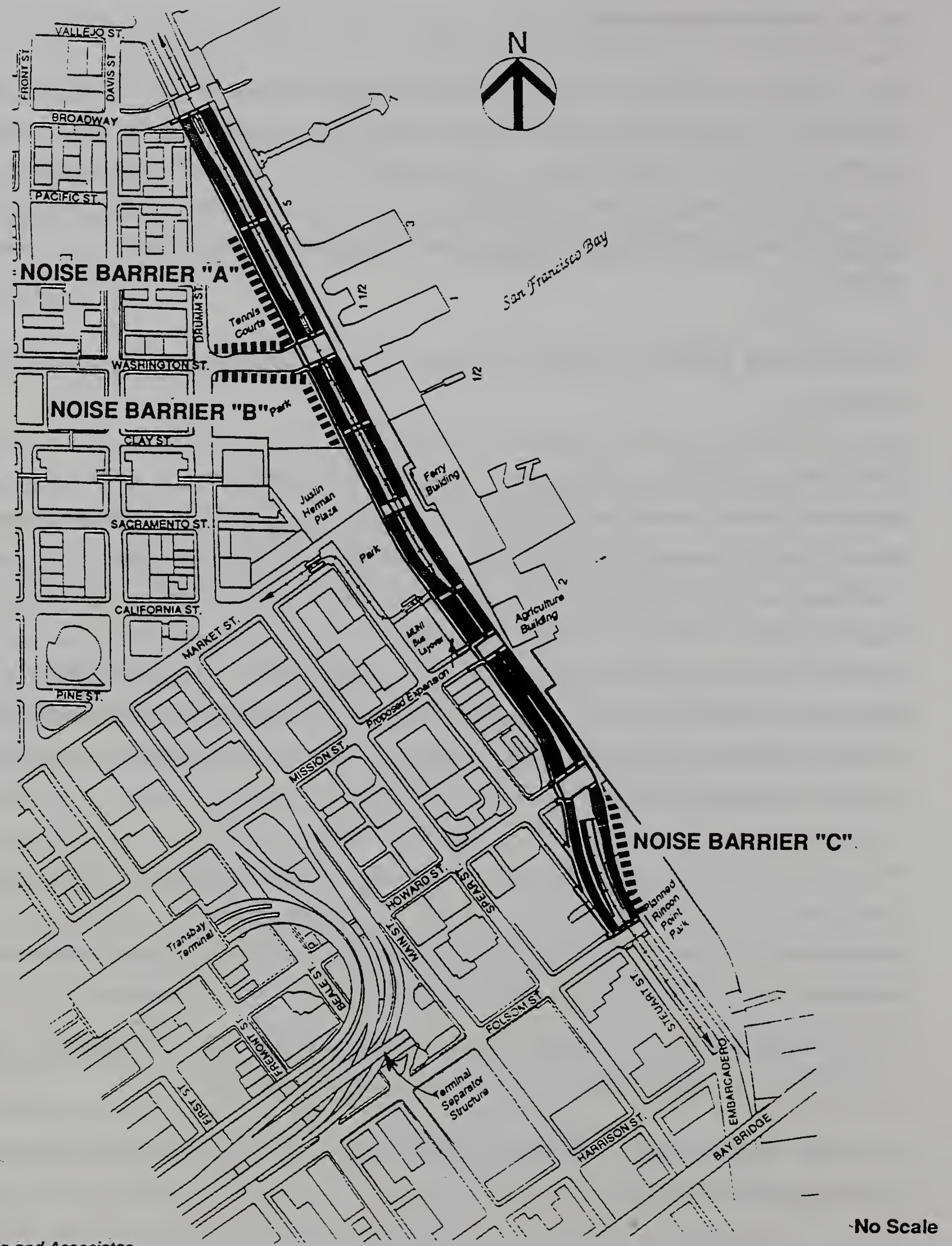
The locations of the three noise barriers considered are shown in Figure 4.7-2. One would shield the Golden Gateway Tennis and Swim Club facilities, one would shield the Embarcadero Plaza (North), and one would shield a portion of the planned Rincon Point Park. Barriers would most likely be of concrete masonry or solid concrete walls. (A similar wall is installed along the eastern edge of Justin Herman Plaza.) Wooden walls of sufficient density could also be used, as could earthen berms or combined berms with a short wall on top. Any noise barriers would have to be designed by a qualified acoustician taking into account the effectiveness of the physical extent of the barrier (i.e., length and height) and the effects of gaps where deemed necessary for pedestrian access.

While a noise barrier at any one of these locations would be physically feasible, barriers would have to be 1.5 or 1.8 meters (five or six feet) in height in order to achieve a 5 dBA reduction in noise levels (considered to be a minimum effective wall by Caltrans. These recommended abatement measures have been considered and rejected for the following reasons:

- Barriers A, B, and C would restrict visual access to the waterfront from public and private open spaces, conflicting with the project's purpose and need; and

- Barrier B would restrict pedestrian access to and from the waterfront, conflicting with the project's purpose and need.

Pursuant to 23 CFR 772.11(2)(f), the views of those impacted, as expressed during review of the Draft EIS/EIR, will be a major consideration in reaching a final decision on the abatement measures to be provided. (If constructed based on positive input from impacted individuals,



Source: Wilson, Ihrig and Associates

Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	**Location of Noise Barriers that were Considered but Rejected due to Conflict with the Project Purpose and Need**	**Figure 4.7-2**

the exact height and length of any noise barriers would be determined in the final design phase of the project.)

Construction Noise Mitigation

- To reduce potential disturbances due to construction-related noise levels, the City would require that project contractors strictly adhere to the San Francisco Noise Ordinance and would require the following additional steps to be taken:
  - Implementation of a careful maintenance and lubrication program for heavy equipment;
  - Installation of temporary noise barriers, mats, or blankets where San Francisco Noise Ordinance limits cannot be met with available equipment;
  - Pre-drilling piles where soil conditions permit;
  - Use of construction equipment modified to lessen noise such as welding instead of riveting, using electric-powered equipment instead of pneumatic tools, using electric instead of air or gasoline driven saws, and use of effective intake and exhaust mufflers on internal combustion engines and compressors;
  - Maximizing physical separation, as far as practical, between noise generators and noise sensitive receptors, such as providing enclosures for stationary equipment and barriers around particularly noisy areas on the site, using shields, impervious fences or other physical sound barriers to inhibit transmission of noise into the surrounding community, and locating stationary equipment so as to minimize impact on the community; and
  - Scheduling of noise-generating activities outside early morning and nighttime hours.

4.8 AIR QUALITY

As required by the Federal Clean Air Act Amendments, newer cars will have lower emissions, and consequently carbon monoxide concentrations will decrease in the future regardless of the project alternative selected. For this reason, a comparison of 1989 (pre-earthquake) or 1993 (existing) air quality conditions to the air quality impacts from the project alternatives in 2015 does not really show how the future alternatives would compare to existing and past conditions. The more important analysis compares potential air quality impacts from project operation under each alternative to applicable Ambient Air Quality Standards (AAQS), BAAQMD significance thresholds, and to other alternatives for the year 2015. To provide a worse case scenario, CO levels were also projected for the Build Year (year 2000) at selected intersections and compared to applicable AAQS.

Projected future development was reflected in the regional growth projections which were used in the transportation analysis. Data from this analysis provided inputs for the air quality analysis. Consequently, the air quality analysis results include potential impacts resulting from projected cumulative development.

4.8.1 TOTAL PROJECT EMISSIONS

The differences between daily emissions under the build alternatives and under the No Build Alternative are compared to San Francisco County transportation emissions for the year 2010 in Table 4.8-1.

The increase in daily total vehicle miles traveled (used for calculating the project emission increases shown in Table 4.8-1) is largest for Alternatives Two and Four.[38] However, the motor vehicle emissions for all alternatives are similar. The project emission increases would be well under the one percent threshold established by the BAAQMD for assessing project impacts.

Comparison of the year 2015 total project motor vehicle emissions to pre-earthquake (1989) and existing (1993) emissions[39] shows that emissions of CO, TOG, ROG, and PM from exhaust would decrease in the future from one fifth to one half of 1989 and 1993 levels. Particulate emissions from road dust in 2015 for the No Build and build alternatives would increase by approximately 10 percent from 1993 and 20 percent from 1989.

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[38] A comparison of traffic volumes for the build alternatives to the No Build Alternative showed increases in vehicle miles traveled (VMT) for Alternatives Two and Four. The VMT for the other build alternatives would decrease compared to the No Build Alternative.

[39] Refer to Section 4.2 of the Air Quality Background Report: Air Quality Impact Analysis (Jonas and Associates 1994) for more details. A copy of this report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

TABLE 4.8-1

MOTOR VEHICLE EMISSION INCREASES ASSOCIATED WITH PROJECT COMPARED TO THE EMISSION INVENTORY

	Project Emission Increases[1] (tons/day)				SF County Emissions[2] (tons/day)		
Pollutant	Alternative 2[3]	Alternatives 3 and 5, 2nd Street Option	Alternatives 3 and 5, 4th Street Option	Alternative 4[4]	1990	1993	2010
Carbon Monoxide	0.0059	--[5]	--	0.0215	170.4	155.0	102.4
Total Organic Gasses	0.0004	--	--	0.0016	28.5	26.4	23.0
Reactive Organic Gasses	0.0004	--	--	0.0015	26.4	23.1	17.6
Nitrogen Oxides	0.0011	--	--	0.0039	17.5	16.3	16.4
Sulfur Oxides	0.0002	--	--	0.0008	1.1	1.1	1.2
Particulate Matter	0.0022	--	--	0.0081	53.3	55.8	74.0
Fine Particulate Matter	0.0010	--	--	0.0037	24.7	25.8	33.7

Source:Jonas and Associates. 1994. Technical Report: Air Quality Impact Analysis.

1 Calculated from EMFAC7Fv1.1. Assumes cold-start/hot-start percentages of 30% and 20%. Temperature of 45°F for carbon monoxide and particulate matter emission calculations and 75°F for organic gases and nitrogen oxide emission calculations.

2 Motor vehicle (and dust) emissions for San Francisco County for the year 2010 and 1993 are scaled using the ratio of 1990 county motor vehicle (and dust) emissions to 1990 total county emissions multiplied by total district emissions for 2010 and 1993, respectively (BAAQMD 1993).

3 An additional 980 vehicle miles traveled per day are associated with Alternative Two compared to the No Build Alternative.

4 An additional 3,580 vehicle miles traveled are associated with Alternative Four compared to the No Build Alternative.

5 Vehicle miles would decrease for alternatives 3 and 5 (Second Street Option) and 3 and 5 (Fourth Street Option) from the No Build Alternative. Project emissions would be less than the No Build Alternative.

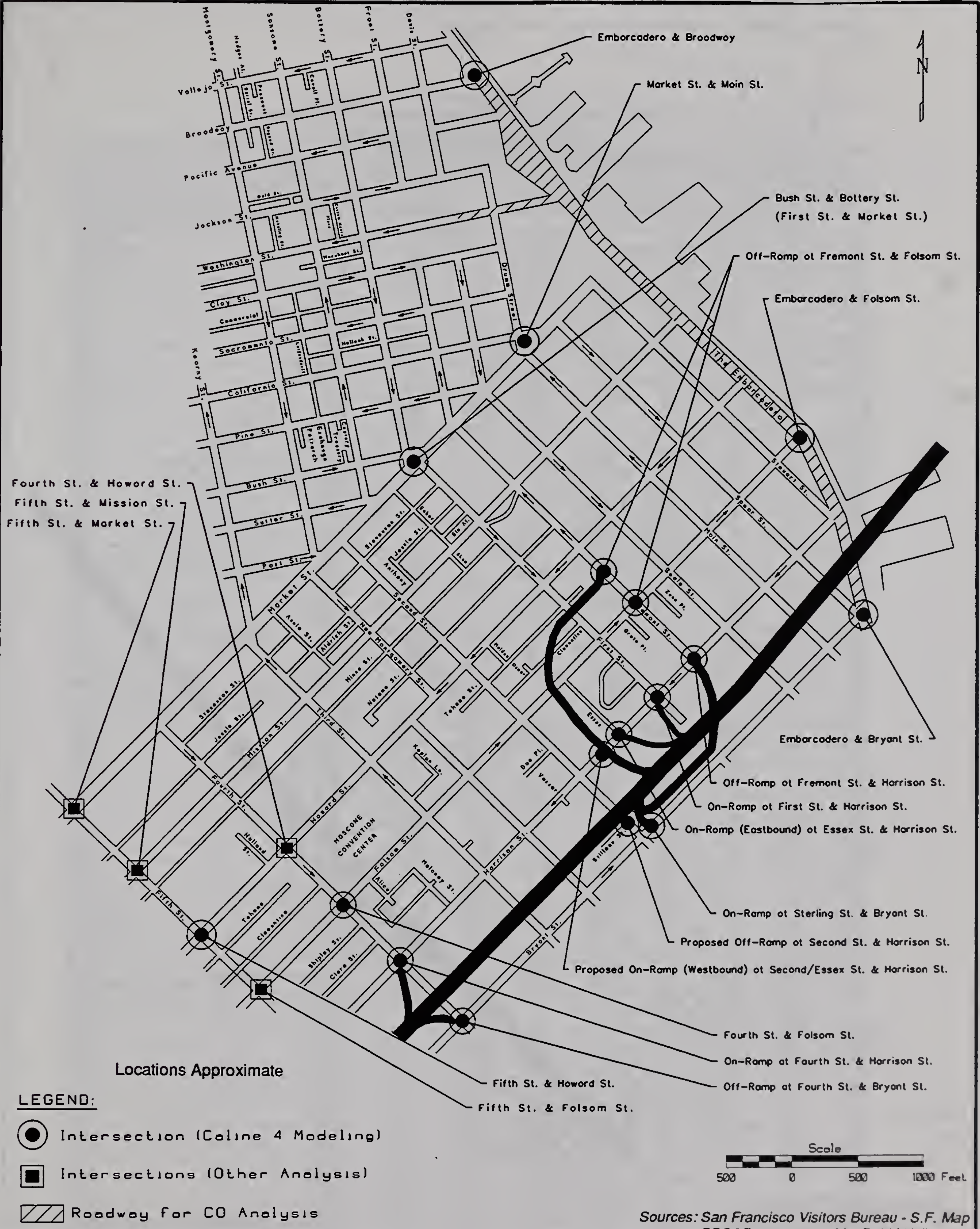
4.8.2 CARBON MONOXIDE

Carbon monoxide (CO) concentrations were predicted at locations within the project area for 1989 (pre-earthquake) and 1993 (existing) conditions, and for 2015 conditions under all project alternatives. Figures 4.8-1 and 4.8-2 illustrate the intersections and roadways which were included in the analyses, and the locations where carbon monoxide concentrations were predicted.

CO concentrations were predicted during the peak traffic hours (morning peak commute hour and evening peak commute hour) and during the maximum 8-hour traffic periods. Results from these CO analyses were compared to Federal and State Ambient Air Quality Standards (AAQS) for CO. These standards are for 1-hour and 8-hour averaging times.

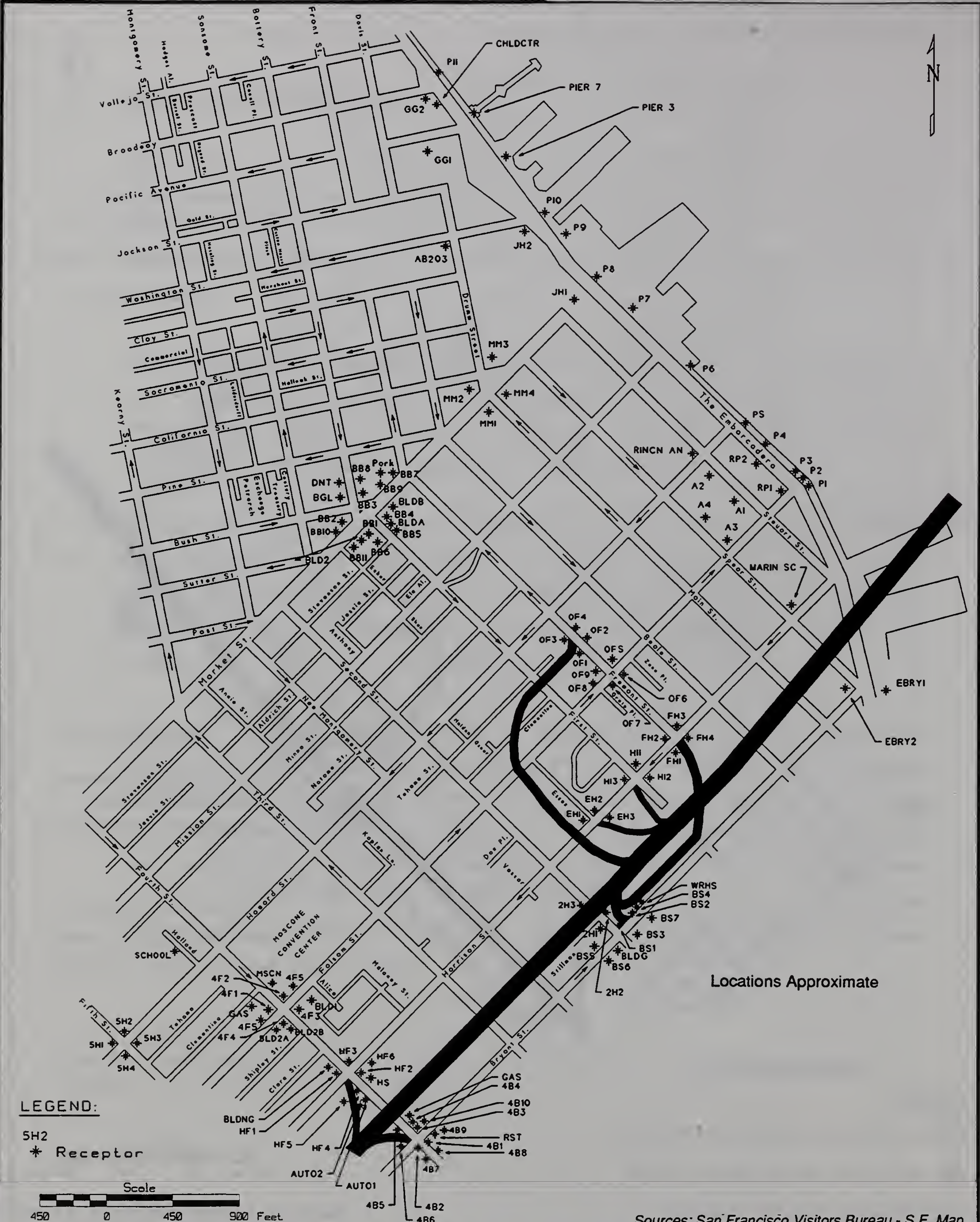
The results of the CALINE4 modeling for 1989 (pre-earthquake), 1993 (existing), and 2015 (No Build and Alternatives Two through Five) are summarized in Tables 4.8-2 and 4.8-3 (1-hour average, A.M. and P.M., respectively) and 4.8-4 (8-hour average). These tables illustrate the maximum predicted CO concentrations at each receptor for each alternative and each year of analysis.

The carbon monoxide analyses show that the No Build alternative and all build alternatives would not exceed the 1-hour or 8-hour California and National Ambient Air Quality Standards (AAQS) for CO in the year 2015. In 1989 (pre-earthquake), several violations of the California AAQS (20.0 ppm; 1-hour average, 9.0 ppm; 8-hour average) and the National AAQS (35 ppm; 1-hour average, 9 ppm; 8-hour average) were predicted by CALINE4 along The Embarcadero and at the analyzed intersections. In 1993, violations of CAAQS were also predicted by CALINE4 but at fewer locations than in 1989. Note that no violations of the CO AAQS have



Sources: San Francisco Visitors Bureau - S.F. Map
PBQ&D, per comm. Ms. Robbi Keil.

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	**Roadways & Intersections Included in the Analysis**	**Figure 4.8-1**



Sources: San Francisco Visitors Bureau - S.F. Map
PBQ&D, per comm. Ms. Robbi Keil.

92.202E & 94.060E
Alternatives to Replacement
of the Embarcadero Freeway
and the
Terminal Separator Structure

Locations of Receptors Included in the Analysis

Figure 4.8-2

TABLE 4.8-2
MODELED CARBON MONOXIDE CONCENTRATIONS:
1-HOUR AVERAGE (ppm) AM PEAK[1]

Receptor ID	1989 pre-earthquake	1993 Existing	2015						
			1	2	3-2nd Street Option	3-4th Street Option	4	5-2nd Street Option	5-4th Street Option
EMBARCADERO RECEPTORS:									
AB203	12.6	8.7	5.0	5.0	4.9	4.9	4.9	4.9	4.9
MARIN SC	11.4	8.3	5.1	5.1	5.2	5.2	5.2	4.6	4.6
RINCN AN	12.6	8.8	5.2	5.2	5.3	5.2	5.3	5.1	5.0
JH1	16.3	11.0	5.7	5.4	5.2	5.2	5.3	6.0	5.9
JH2	15.5	10.0	5.4	5.5	5.3	5.3	5.4	5.4	5.3
GG1	13.6	10.1	5.3	5.3	5.2	5.2	5.3	5.2	5.2
GG2	20.7[2]	13.7	6.1	6.2	6.1	6.1	6.2	6.1	6.1
RP1	18.7	12.8	5.6	5.7	5.7	5.6	5.7	4.6	4.6
RP2	26.2	17.0	5.4	5.4	5.5	5.4	5.5	4.6	4.6
PIER 3	15.5	11.3	5.6	6.1	5.8	5.9	6.0	5.9	5.9
PIER7	16.8	13.8	5.8	6.0	5.9	5.9	6.1	5.9	5.9
P1	17.9	12.5	5.2	5.1	5.2	5.2	5.3	5.1	5.0
P2	17.3	13.4	5.1	5.1	5.2	5.2	5.2	5.1	5.0
P3	18.0	16.2	5.1	5.2	5.2	5.2	5.2	5.1	5.0
P4	19.1	13.5	5.2	5.2	5.2	5.2	5.3	5.2	5.1
P5	17.5	12.1	5.5	5.4	5.3	5.3	5.5	5.4	5.3
P6	16.8	11.4	5.9	5.7	5.6	5.6	5.8	5.5	5.4
P7	15.0	10.4	5.5	5.6	5.5	5.4	5.6	5.4	5.3
P8	16.3	11.8	5.7	5.8	5.6	5.5	5.7	5.5	5.4
P9	16.5	12.0	5.7	5.9	5.7	5.6	5.8	5.7	5.6
P10	15.6	11.3	5.5	5.9	5.7	5.6	5.8	5.6	5.5
P11	17.6	12.7	5.6	6.0	5.9	5.9	6.0	5.9	5.9
A1	13.9	9.2	5.8	5.7	6.0	5.8	5.9	4.6	4.6
A2	13.3	8.9	5.3	5.3	5.4	5.3	5.4	4.6	4.6
A3	11.9	8.4	5.3	5.2	5.4	5.4	5.4	4.6	4.6
A4	11.7	8.4	5.1	5.1	5.2	5.2	5.2	4.6	4.6
EBRY1	19.7	14.2	5.9	6.2	5.8	6.0	6.0	4.6	4.6
EBRY2	15.4	11.5	6.8	6.8	6.6	6.8	6.8	4.6	4.6
OTHER INTERSECTION RECEPTORS:									
BB1	24.9	19.4	7.0	7.1	7.0	6.9	7.1	7.0	6.9
BB2	20.6	16.2	6.7	6.7	6.5	6.5	6.9	6.5	6.5
BB3	24.3	19.0	7.6	7.6	7.6	7.6	7.8	7.6	7.6
BB4	25.2	20.1	7.2	7.2	7.1	7.0	7.2	7.1	7.0
BB5	20.4	16.4	6.5	6.6	6.6	6.5	6.6	6.6	6.5
BB6	19.4	15.7	6.4	6.5	6.4	6.3	6.5	6.4	6.3
BB7	26.7	13.6	6.1	6.5	6.0	6.0	6.6	6.0	6.0
BB8	27.3	20.4	8.0	8.0	8.1	8.0	8.3	8.1	8.0
BB9	19.9	14.7	6.1	6.2	6.1	6.0	6.2	6.1	6.0
BB10	17.5	12.2	5.9	5.8	5.7	5.5	5.8	5.7	5.5
BB11	17.0	11.7	5.9	5.7	5.6	5.4	5.7	5.6	5.4
BLDNG1A	21.7	17.4	6.6	6.7	6.7	6.6	6.7	6.7	6.6
BLDNG1B	17.7	13.6	6.0	6.0	5.9	5.8	6.0	5.9	5.8
BLDNG2	21.1	14.7	6.1	6.2	6.1	6.0	6.2	6.1	6.0
PARK	15.6	11.9	5.8	5.8	5.8	5.8	5.9	5.8	5.8
DONUT	25.8	18.5	7.4	7.4	7.6	7.5	7.7	7.6	7.5
BAGEL	20.2	15.9	6.9	6.8	6.8	6.8	7.0	6.8	6.8
MM1	21.2	14.4	6.9	6.7	6.4	6.6	7.1	6.4	6.6
MM2	22.0	13.9	6.4	6.3	6.2	6.2	6.7	6.2	6.2
MM3	20.6	12.9	6.2	6.2	6.2	6.2	6.4	6.2	6.2
MM4	20.0	13.8	6.7	6.5	6.2	6.4	6.9	6.2	6.4
OF1	14.5	11.0	5.6	5.8	5.8	5.7	5.7	5.8	5.7
OF2	14.3	11.3	6.0	5.7	5.7	5.6	5.7	5.7	5.6
OF3	13.3	10.3	5.5	5.4	5.4	5.3	5.3	5.4	5.3
OF4	14.6	11.7	6.1	5.9	5.9	5.8	5.8	5.9	5.8
OF5	15.7	12.0	5.8	6.3	6.3	6.2	6.0	6.3	6.2
OF6	21.9	16.4	6.9	7.4	7.4	7.1	7.1	7.4	7.1
OF7	25.3	19.5	7.3	8.0	8.0	7.8	7.9	8.0	7.8
OF8	23.4	17.4	7.1	7.6	7.6	7.3	7.1	7.6	7.3
OF9	27.3	20.0	7.7	8.2	8.2	7.8	7.5	8.2	7.8
EH1	20.6	14.6	6.5	6.3	6.2	6.0	5.4	6.2	6.0
EH2	24.8	15.3	6.6	6.4	6.2	6.0	5.2	6.2	6.0
EH3	16.0	11.6	5.7	5.6	6.4	6.2	5.6	6.4	6.2

CONTINUED...

TABLE 4.8-2 (continued)
MODELED CARBON MONOXIDE CONCENTRATIONS:
1-HOUR AVERAGE (ppm) AM PEAK[1]

Receptor ID	1989 pre-earthquake	1993 Existing	2015						
			1	2	3-2nd Street Option	3-4th Street Option	4	5-2nd Street Option	5-4th Street Option
H11	21.9	23.0	7.5	7.3	6.7	6.4	6.7	6.7	6.1
H12	18.1	16.5	6.8	6.4	5.8	4.8	5.8	5.8	4.6
H13	22.6	22.0	7.8	7.3	6.4	6.0	6.4	6.4	6.0
FH1	20.8	17.5	7.5	7.4	6.8	6.8	6.3	6.9	6.8
FH2	24.1	19.8	7.5	7.3	7.5	7.3	6.7	7.5	7.3
FH3	23.5	20.7	6.0	8.2	7.7	7.5	6.7	7.7	7.5
FH4	19.3	17.7	7.5	7.3	6.9	6.9	6.4	6.9	6.9
BS1/BLDNG	10.1	8.3	5.0	4.8	4.8	4.8	4.8	4.8	4.8
BS2	10.0	8.3	5.0	4.8	4.8	4.8	4.9	4.9	4.8
BS3/BLDN	10.0	8.6	5.0	5.0	4.8	4.8	5.0	4.8	4.8
BS4	10.2	8.3	5.0	4.9	4.8	4.8	4.9	4.8	4.8
BS5	10.1	8.4	5.0	4.9	4.8	4.8	4.9	4.8	4.8
BS6	10.1	8.8	5.0	5.1	4.9	4.9	5.1	4.9	4.9
BS7	10.0	8.6	5.0	5.0	4.9	4.9	5.0	4.9	4.9
WAREHOUSE	10.2	8.2	4.9	4.9	4.8	4.8	4.9	4.8	4.8
BLDNG	10.0	8.8	5.1	5.0	4.9	4.9	5.0	4.9	4.9
HF1	19.0	16.6	7.3	5.9	6.8	6.7	7.7	6.8	6.7
HF2	22.4	19.6	8.5	6.4	7.6	7.7	9.1	7.6	7.7
HF3	21.7	19.4	8.4	6.3	7.5	7.3	8.9	7.5	7.3
HF4	17.8	15.5	7.1	6.0	6.3	6.4	7.3	6.3	6.4
HF5	15.6	12.9	6.2	5.5	5.8	5.8	6.4	5.8	5.8
HF6	26.0	20.6	8.7	6.9	7.1	7.3	8.8	7.1	7.3
HS	14.9	11.9	6.0	5.4	5.9	5.9	6.3	5.9	5.9
AUTO 1	15.2	12.4	6.2	5.5	5.9	5.9	6.4	5.9	5.9
AUTO 2	14.6	12.1	6.0	5.4	5.8	5.8	6.2	5.8	5.8
BLDNG	20.3	18.4	7.2	6.2	7.4	7.3	7.9	7.4	7.3
4B1	24.8	21.2	8.6	8.5	7.0	8.1	8.5	7.0	8.1
4B2	25.5	21.3	8.7	8.5	7.1	8.0	8.7	7.1	8.0
4B3	24.8	20.9	8.5	8.5	6.9	8.1	8.5	6.9	8.1
4B4	22.3	16.5	7.3	7.1	6.8	7.0	7.2	6.8	7.0
4B5	22.5	17.0	7.4	7.2	6.6	7.3	7.2	6.6	7.3
4B6	25.8	21.7	8.6	8.6	6.9	8.4	8.7	6.9	8.4
4B7	19.8	15.7	7.1	6.9	6.3	6.7	7.0	6.3	6.7
4B8	19.4	15.6	7.1	6.9	6.2	6.7	7.0	6.2	6.7
4B9	23.4	20.4	8.4	8.3	6.8	7.9	8.4	6.8	7.9
4B10	22.8	19.8	8.2	8.2	6.6	7.8	8.2	6.6	7.8
RESTAURANT	23.9	20.6	8.5	8.3	6.8	8.0	8.4	6.8	8.0
GAS STATION	19.3	15.6	7.1	6.9	6.1	6.7	7.0	6.1	6.7
4F1	27.9	20.9	9.3	8.5	8.4	9.5	8.5	8.4	9.5
4F2	28.9	21.7	9.1	8.4	8.3	9.2	8.4	8.3	9.2
4F3	25.5	19.4	8.5	7.9	7.8	8.7	7.9	7.8	8.7
4F4	29.5	22.7	9.0	8.6	8.7	9.3	8.6	8.7	9.3
4F5	22.8	17.2	7.9	7.4	7.3	8.0	7.4	7.3	8.0
4F6	26.0	19.5	8.8	8.2	8.1	8.8	8.2	8.1	8.8
MOSCONE	23.8	18.7	7.7	7.3	7.7	8.2	7.3	7.7	8.2
BLDNG2	17.9	13.7	6.7	6.3	6.3	6.7	6.4	6.3	6.7
BLDNG2A	32.1	24.5	9.7	9.1	9.4	10.1	9.2	9.4	10.1
BLDNG2B	25.5	19.7	8.0	7.7	7.9	8.2	7.8	7.9	8.2
GAS	29.0	22.3	8.5	8.2	8.1	8.3	8.2	8.1	8.3
5H1	30.0	15.9	8.8	9.1	8.6	8.8	8.9	8.6	8.8
5H2	30.5	18.1	9.4	10.0	9.7	9.6	9.7	9.7	9.6
5H3	27.9	15.5	8.6	8.9	8.5	8.6	8.8	8.5	8.6
5H4	31.0	17.0	8.8	9.4	9.0	9.0	9.0	9.0	9.0
SCHOOL	11.5	8.6	5.2	5.2	5.2	5.2	5.2	5.2	5.2
2H1	12.5	11.0	5.1	5.1	6.1	5.0	5.1	6.1	5.0
2H2	12.4	11.0	5.1	5.1	6.1	5.0	5.1	6.1	5.0
2H3	12.9	13.1	5.2	5.2	6.1	5.1	5.1	6.1	5.1

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1 Source: CALINE4 modeling. Total impact (local + background concentrations) is shown. Background concentrations are: 9.0 ppm (1989), 7.2 ppm (1993), and 4.6 ppm (2015).

2 Underlined values exceed California and/or National Ambient Air Quality Standards.

TABLE 4.8-3
MODELED CARBON MONOXIDE CONCENTRATIONS: 1-HOUR AVERAGE (ppm) PM PEAK

Receptor ID	1989 pre-earthquake	1993 Existing	2015						
			1	2	3-2nd Street Option	3-4th Street Option	4	5-2nd Street Option	5-4th Street Option
EMBARCADERO RECEPTORS:									
AB203	13.3	9.7	5.3	5.1	5.1	5.1	5.1	5.1	5.2
MARIN SC	12.8	8.6	5.7	5.2	5.3	5.3	5.4	5.3	5.3
RINCN AN	14.2	9.3	5.7	5.3	5.4	5.6	5.4	5.4	5.5
JH1	21.7	12.0	6.6	5.5	5.6	5.7	5.6	7.0	7.1
JH2	17.9	11.1	6.2	5.6	5.8	5.9	5.7	5.8	5.9
GG1	16.1	11.1	5.6	5.4	5.4	5.4	5.4	5.4	5.5
GG2	23.9	15.2	6.6	6.3	6.3	6.3	6.3	6.3	6.3
CHILDCTR	–	–	7.4	6.8	6.8	6.8	6.8	6.8	6.8
RP1	22.7	12.7	6.3	5.6	5.6	5.6	5.6	5.6	5.6
RP2	36.7	17.7	6.7	5.5	5.6	5.6	5.7	5.6	5.6
PIER 3	16.8	13.5	7.1	6.6	7.6	8.1	7.3	7.6	8.1
PIER7	21.2	15.8	6.8	6.5	6.8	6.9	6.8	6.8	6.9
P1	22.4	13.6	5.9	5.3	5.4	5.4	5.4	5.4	5.4
P2	22.2	15.0	6.0	5.3	5.4	5.4	5.4	5.4	5.5
P3	24.4	17.7	6.0	5.3	5.4	5.5	5.4	5.4	5.5
P4	23.1	14.4	6.4	5.5	5.6	5.6	5.6	5.6	5.6
P5	20.6	13.9	7.2	5.7	5.8	5.9	5.8	5.8	5.9
P6	18.1	12.6	8.3	5.9	6.0	6.2	6.2	5.9	6.1
P7	16.4	11.7	7.0	5.7	5.9	6.1	5.9	5.8	6.0
P8	19.1	15.2	8.0	5.9	6.2	6.4	6.2	6.1	6.3
P9	19.1	15.4	7.9	6.1	6.3	6.7	6.2	6.4	6.8
P10	17.6	13.5	7.3	6.2	6.5	6.8	6.4	6.5	6.8
P11	22.9	13.1	6.1	6.2	6.2	6.3	6.3	6.2	6.3
A1	16.4	9.6	6.5	6.0	6.0	5.8	6.1	6.0	5.8
A2	16.0	9.4	5.7	5.3	5.4	5.3	5.4	5.4	5.3
A3	13.3	8.6	5.7	5.3	5.5	5.5	5.5	5.5	5.5
A4	13.4	8.7	5.3	5.1	5.2	5.2	5.3	5.2	5.2
EBRY1	17.0	16.4	6.3	5.9	6.0	6.0	6.1	6.0	6.0
EBRY2	14.4	11.8	6.7	6.4	6.9	6.9	7.0	6.9	6.9
OTHER INTERSECTION RECEPTORS:									
BB1	30.0	21.8	7.5	7.6	7.5	7.6	7.5	7.5	7.6
BB2	20.6	16.5	7.2	7.0	6.8	6.8	6.9	6.8	6.8
BB3	26.8	21.0	8.7	8.3	7.9	8.0	8.1	7.9	8.0
BB4	28.6	20.2	7.3	7.4	7.6	7.4	7.3	7.6	7.4
BB5	25.5	18.2	6.7	6.9	7.0	7.1	6.9	7.0	7.1
BB6	26.0	18.7	6.9	7.0	7.0	7.1	6.9	7.0	7.1
BB7	26.7	18.4	7.2	7.3	6.8	7.0	7.2	6.8	7.0
BB8	26.8	21.1	8.7	8.4	8.2	8.2	8.4	8.2	8.2
BB9	23.5	16.6	6.3	6.5	6.4	6.5	6.4	6.4	6.5
BB10	19.0	13.7	6.2	6.1	6.4	6.1	6.1	6.4	6.1
BB11	19.0	13.6	6.2	6.1	6.4	5.9	6.0	6.4	5.9
BLDNG1A	25.2	18.7	6.6	6.9	6.9	7.0	6.9	6.9	7.0
BLDNG1B	20.6	14.9	6.1	6.2	6.4	6.2	6.2	6.4	6.2
BLDNG2	24.1	17.0	6.5	6.7	6.5	6.6	6.6	6.5	6.6
PARK	18.5	13.2	6.3	6.1	6.0	6.0	6.1	6.0	6.0
DONUT	27.8	20.7	8.4	8.2	7.9	8.0	8.1	7.9	8.0
BAGEL	21.9	16.8	7.5	7.3	7.0	7.1	7.2	7.0	7.1
MM1	21.8	12.9	6.4	7.2	7.2	6.8	6.9	7.2	6.8
MM2	22.3	13.4	6.3	7.3	7.0	6.9	7.0	7.0	6.9
MM3	21.7	14.5	6.2	6.9	6.8	6.7	6.9	6.8	6.7
MM4	20.9	13.1	6.4	7.0	7.0	6.7	6.8	7.0	6.7
OF1	14.2	10.3	5.5	5.5	5.5	5.4	5.8	5.5	5.4
OF2	13.5	11.0	5.6	5.4	5.4	5.3	5.6	5.4	5.3
OF3	12.2	9.8	5.4	5.2	5.2	5.1	5.6	5.2	5.1
OF4	13.3	11.1	5.7	5.5	5.5	5.3	5.7	5.5	5.3
OF5	15.5	11.6	5.8	5.9	5.9	5.6	7.5	5.9	5.6
OF6	20.9	14.7	7.0	6.3	6.3	6.1	6.6	6.3	6.1
OF7	23.1	15.5	7.0	6.6	6.6	6.4	6.8	6.6	6.4
OF8	21.7	15.6	7.1	6.6	6.6	6.0	6.6	6.6	6.0
OF9	24.0	17.0	7.5	6.8	6.8	6.1	6.9	6.8	6.1

CONTINUED...

TABLE 4.8-3 (continued)
MODELED CARBON MONOXIDE CONCENTRATIONS: 1-HOUR AVERAGE (ppm) PM PEAK

Receptor ID	1989 pre-earthquake	1993 Existing	2015						
			1	2	3-2nd Street Option	3-4th Street Option	4	5-2nd Street Option	5-4th Street Option
EH1	24.0	18.9	7.3	7.1	6.7	6.8	6.1	6.7	6.8
EH2	23.3	20.1	6.9	6.8	6.8	6.8	5.8	6.8	6.8
EH3	16.6	13.4	5.8	6.0	6.5	7.0	6.5	6.5	7.0
H11	25.2	33.6	11.5	9.1	9.3	10.0	9.1	9.3	10.0
H12	17.9	23.5	9.2	7.8	7.6	8.5	7.5	7.6	8.5
H13	27.9	34.2	11.6	8.8	9.4	10.1	9.1	9.4	10.1
FH1	16.3	15.7	6.8	5.9	6.1	6.2	6.2	6.1	6.2
FH2	20.9	17.2	6.5	5.9	6.6	6.6	6.6	6.6	6.6
FH3	19.8	16.9	7.1	5.7	6.5	6.5	6.6	6.5	6.5
FH4	16.9	15.1	6.7	5.8	6.2	6.2	6.2	6.2	6.2
BS1/BLDNG	12.0	8.2	4.9	4.8	7.4	6.6	7.5	7.4	6.6
BS2	12.0	8.2	5.0	4.8	8.7	7.6	8.2	8.7	7.6
BS3/BLDN	10.7	8.3	4.9	4.9	5.8	5.6	6.1	5.8	5.6
BS4	11.2	8.3	5.0	4.9	7.5	7.1	7.5	7.5	7.1
BS5	12.0	8.1	4.9	4.8	7.3	6.7	7.8	7.3	6.7
BS6	10.9	8.6	5.0	5.0	6.0	5.7	6.3	6.0	5.7
BS7	10.6	8.3	4.9	4.9	5.8	5.6	5.9	5.8	5.6
WAREHOUS	10.7	8.4	5.0	4.9	7.3	6.7	7.3	7.3	6.7
BLDNG	10.9	8.5	5.0	4.9	6.0	5.7	6.4	6.0	5.7
HF1	20.8	26.5	9.8	9.7	8.3	8.3	9.9	8.3	8.3
HF2	22.7	31.0	11.0	10.9	9.5	9.5	11.9	9.5	9.5
HF3	22.8	31.0	10.9	10.9	8.8	8.8	10.6	8.8	8.8
HF4	20.3	25.6	9.5	9.5	8.2	8.1	9.6	8.2	8.1
HF5	17.4	20.9	8.3	8.2	7.3	7.2	8.3	7.3	7.2
HF6	24.1	32.1	11.9	11.6	8.5	8.5	10.9	8.5	8.5
HS	16.0	15.1	7.1	6.9	6.7	6.7	7.5	6.7	6.7
AUTO 1	15.9	16.6	7.2	7.2	6.5	6.5	7.1	6.5	6.5
AUTO 2	15.2	16.3	7.1	7.1	6.3	6.3	7.0	6.3	6.3
BLDNG	22.5	25.7	9.8	9.5	8.5	8.6	9.9	8.5	8.6
4B1	16.5	20.1	7.3	7.3	7.1	7.3	7.5	7.1	7.3
4B2	16.4	23.2	7.7	7.7	7.4	7.4	7.9	7.4	7.4
4B3	16.0	21.0	7.5	7.4	7.3	7.5	7.7	7.3	7.5
4B4	18.0	17.5	6.8	6.9	7.4	7.3	7.5	7.4	7.3
4B5	17.3	16.8	6.6	6.7	7.2	7.1	7.3	7.2	7.1
4B6	15.7	24.3	7.9	7.9	7.6	7.6	8.1	7.6	7.6
4B7	14.7	15.4	6.2	6.2	6.4	6.5	6.5	6.4	6.5
4B8	14.5	15.0	6.2	6.2	6.3	6.4	6.5	6.3	6.4
4B9	14.8	18.7	7.1	7.0	6.9	7.1	7.2	6.9	7.1
4B10	14.7	18.5	7.0	7.0	6.8	7.1	7.2	6.8	7.1
RESTAURANT	15.0	19.3	7.2	7.2	7.0	7.2	7.4	7.0	7.2
GAS STATION	15.5	16.4	6.5	6.4	6.6	6.6	6.7	6.6	6.6
4F1	24.3	20.8	8.4	8.7	8.2	8.4	8.6	8.2	8.4
4F2	24.0	20.4	8.5	9.2	8.1	8.2	8.3	8.1	8.2
4F3	21.8	16.5	7.9	8.3	7.6	7.8	7.9	7.6	7.8
4F4	25.4	19.3	8.9	9.5	8.7	8.8	9.0	8.7	8.8
4F5	20.5	15.7	7.6	7.9	7.2	7.3	7.3	7.2	7.3
4F6	23.0	19.1	7.9	8.0	7.5	7.5	7.5	7.5	7.5
MOSCONE	21.9	17.8	7.9	8.6	7.6	7.8	7.9	7.6	7.8
BLDNG2	16.0	12.1	6.4	6.5	6.2	6.2	6.3	6.2	6.2
BLDNG2A	29.7	23.1	9.7	10.1	9.3	9.4	9.5	9.3	9.4
BLDNG2B	23.0	16.9	8.3	8.7	8.0	8.1	8.3	8.0	8.1
GAS	22.7	19.7	8.2	9.1	7.9	8.1	8.3	7.9	8.1
5H1	35.6	21.7	10.9	11.0	10.0	10.8	10.1	10.0	10.8
5H2	36.0	22.5	10.7	10.3	10.5	11.1	10.0	10.5	11.1
5H3	33.3	22.4	10.6	10.7	10.2	10.5	9.7	10.2	10.5
5H4	34.1	20.8	10.3	10.0	9.8	10.3	9.8	9.8	10.3
SCHOOL	13.6	10.2	5.7	5.8	5.6	5.7	5.6	5.6	5.7
2H1	12.3	9.3	5.2	5.2	6.2	5.0	5.2	6.2	5.0
2H2	12.2	9.3	5.2	5.2	6.3	5.0	5.2	6.3	5.0
2H3	13.6	9.7	5.4	5.4	6.0	5.0	5.2	6.0	5.0

TABLE 4.8-4
MODELED CARBON MONOXIDE CONCENTRATIONS: 8-HOUR AVERAGE (ppm)

Receptor ID	1989 pre-earthquake	1993 Existing	2015						
			1	2	3-2nd Street Option	3-4th Street Option	4	5-2nd Street Option	5-4th Street Option
EMBARCADERO RECEPTORS:									
AB203	8.0	5.8	3.5	3.3	3.4	3.4	3.4	3.4	3.4
MARIN SC	7.6	5.5	3.6	3.4	3.4	3.4	3.5	3.4	3.4
RINCN AN	8.4	5.8	3.6	3.4	3.5	3.5	3.5	3.5	3.5
JH1	11.7	7.0	4.1	3.6	3.7	3.8	3.7	4.2	4.3
JH2	10.2	6.6	4.0	3.7	3.8	3.8	3.7	3.8	3.9
GG1	8.9	6.7	3.6	3.5	3.5	3.6	3.5	3.5	3.6
GG2	13.7	9.4	4.4	4.2	4.2	4.2	4.2	4.2	4.2
CHILDCTR	–	–	4.9	4.5	4.6	4.6	4.6	4.6	4.6
RP1	13.1	9.0	3.9	3.6	3.6	3.6	3.6	3.6	3.6
RP2	18.6	11.1	4.1	3.5	3.5	3.5	3.6	3.5	3.5
PIER 3	10.1	7.8	4.5	4.2	4.7	4.9	4.6	4.7	4.9
PIER7	11.1	8.9	4.2	4.0	4.2	4.3	4.2	4.2	4.3
P1	13.9	8.3	3.7	3.4	3.4	3.4	3.4	3.4	3.4
P2	13.1	9.0	3.7	3.4	3.4	3.5	3.5	3.4	3.5
P3	13.7	11.0	3.7	3.4	3.4	3.5	3.5	3.5	3.5
P4	12.9	8.8	3.9	3.5	3.5	3.6	3.6	3.5	3.6
P5	11.0	7.8	4.3	3.6	3.7	3.7	3.7	3.7	3.7
P6	10.7	7.6	4.9	3.8	3.8	3.9	3.9	3.8	3.9
P7	9.7	7.2	4.4	3.7	3.9	4.0	3.9	3.9	4.0
P8	10.6	8.3	4.8	3.8	4.0	4.2	4.0	4.0	4.1
P9	10.7	8.4	4.8	3.9	4.2	4.4	4.1	4.2	4.3
P10	10.2	7.9	4.5	3.9	4.2	4.4	4.1	4.2	4.3
P11	13.3	8.4	4.0	4.0	4.0	4.1	4.0	4.0	4.1
A1	9.7	6.0	4.2	3.9	3.9	3.8	4.0	3.9	3.8
A2	9.1	5.8	3.8	3.5	3.6	3.5	3.6	3.6	3.5
A3	8.1	5.5	3.6	3.4	3.5	3.5	3.5	3.5	3.5
A4	8.1	5.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4
EBRY1	10.7	9.5	4.1	3.9	3.9	3.9	4.0	3.9	3.9
EBRY2	9.2	7.5	4.4	4.2	4.5	4.5	4.5	4.5	4.5
OTHER INTERSECTION RECEPTORS:									
BB1	20.3	17.6	5.0	5.1	5.1	5.1	5.0	5.1	5.1
BB2	12.9	10.5	4.7	4.6	4.5	4.5	4.6	4.5	4.5
BB3	18.9	15.3	6.0	5.8	5.6	5.6	5.7	5.6	5.6
BB4	20.7	18.4	5.0	5.1	5.3	5.2	5.1	5.3	5.2
BB5	16.7	13.4	4.6	4.7	4.7	4.8	4.7	4.7	4.8
BB6	16.2	12.9	4.5	4.6	4.6	4.6	4.5	4.6	4.6
BB7	18.1	14.9	5.0	5.0	4.6	4.7	4.9	4.6	4.7
BB8	19.2	17.5	6.2	6.0	5.8	5.9	6.0	5.8	5.9
BB9	15.8	13.4	4.3	4.4	4.4	4.4	4.4	4.4	4.4
BB10	12.7	10.1	4.2	4.1	4.3	4.1	4.1	4.3	4.1
BB11	12.3	10.4	4.2	4.1	4.3	4.0	4.1	4.3	4.0
BLDNG1A	17.3	14.5	4.6	4.7	4.8	4.8	4.7	4.8	4.8
BLDNG1B	13.7	12.2	4.3	4.3	4.3	4.2	4.3	4.3	4.2
BLDNG2	15.9	13.7	4.5	4.5	4.4	4.4	4.5	4.4	4.4
PARK	12.0	10.0	4.2	4.1	4.1	4.1	4.1	4.1	4.1
DONUT	19.7	16.5	6.0	5.8	5.6	5.6	5.8	5.6	5.6
BAGEL	15.6	12.6	5.3	5.1	4.9	4.9	5.0	4.9	4.9
MM1	12.9	8.2	4.3	4.5	4.4	4.3	4.4	4.4	4.3
MM2	12.9	8.3	4.3	4.4	4.3	4.2	4.3	4.3	4.2
MM3	12.8	8.2	4.1	4.2	4.2	4.2	4.3	4.2	4.2
MM4	12.2	7.9	4.2	4.4	4.3	4.2	4.3	4.3	4.2
OF1	8.8	6.7	3.6	3.6	3.7	3.7	3.7	3.7	3.7
OF2	8.3	6.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6
OF3	8.0	6.3	3.6	3.6	3.5	3.5	3.5	3.5	3.5
OF4	8.6	7.0	3.8	3.8	3.7	3.7	3.7	3.7	3.7
OF5	9.4	7.4	3.7	3.7	4.0	3.9	4.0	4.0	3.9
OF6	12.3	9.6	4.2	4.2	4.5	4.4	4.6	4.5	4.4
OF7	13.7	11.3	4.4	4.5	4.8	4.7	5.0	4.8	4.7

CONTINUED...

TABLE 4.8-4 (continued)
MODELED CARBON MONOXIDE CONCENTRATIONS: 8-HOUR AVERAGE (ppm)

Receptor ID	1989 pre-earthquake	1993 Existing	2015						
			1	2	3-2nd Street Option	3-4th Street Option	4	5-2nd Street Option	5-4th Street Option
OF8	12.7	9.8	4.4	4.4	4.7	4.6	4.5	4.7	4.6
OF9	16.1	12.4	4.9	5.1	5.3	5.0	5.0	5.3	5.0
EH1	11.3	9.7	4.0	4.1	4.0	4.0	3.7	4.0	4.0
EH2	11.5	9.6	4.1	4.0	4.1	4.1	3.6	4.1	4.1
EH3	8.8	7.3	3.6	3.6	3.8	4.0	3.8	3.8	4.0
H11	13.7	17.7	6.6	5.4	5.5	6.1	5.4	5.5	6.1
H12	10.9	12.5	5.2	4.5	4.5	4.8	4.4	4.5	4.8
H13	14.6	17.5	6.6	5.3	5.7	6.4	5.7	5.7	6.4
FH1	12.6	10.3	4.7	4.6	4.1	4.0	3.9	4.1	4.0
FH2	13.8	11.3	4.9	4.8	4.5	4.4	4.1	4.5	4.4
FH3	15.4	13.1	5.3	5.3	4.9	4.7	4.3	4.9	4.7
FH4	12.7	11.2	5.0	5.0	4.4	4.4	4.2	4.4	4.4
BS1/BLDNG	7.3	5.3	3.2	3.2	4.1	4.0	4.6	4.1	4.0
BS2	7.2	5.3	3.3	3.2	4.8	4.6	4.6	4.8	4.6
BS3/BLDN	6.8	5.3	3.2	3.2	3.7	3.6	3.8	3.7	3.6
BS4	6.9	5.3	3.3	3.2	4.3	4.3	4.3	4.3	4.3
BS5	7.2	5.3	3.2	3.2	4.2	4.0	4.6	4.2	4.0
BS6	6.9	5.4	3.3	3.3	3.8	3.7	4.0	3.8	3.7
BS7	6.7	5.3	3.3	3.2	3.7	3.6	3.7	3.7	3.6
WAREHOUS	6.7	5.3	3.3	3.2	4.2	4.1	4.2	4.2	4.1
BLDNG	6.9	5.4	3.3	3.3	3.8	3.7	4.1	3.8	3.7
HF1	14.0	17.3	6.5	6.5	5.6	5.6	6.6	5.6	5.6
HF2	15.4	21.7	7.8	7.7	6.4	6.4	8.2	6.4	6.4
HF3	15.2	21.0	7.5	7.5	6.0	6.0	7.6	6.0	6.0
HF4	12.7	15.6	6.1	6.0	5.2	5.2	6.2	5.2	5.2
HF5	10.8	12.5	5.2	5.2	4.6	4.6	5.3	4.6	4.6
HF6	17.2	23.1	8.5	8.3	6.1	6.1	7.8	6.1	6.1
HS	10.5	10.7	4.9	4.8	4.4	4.4	5.0	4.4	4.4
AUTO 1	10.4	11.2	4.9	4.8	4.4	4.4	5.0	4.4	4.4
AUTO 2	10.1	10.9	4.8	4.8	4.3	4.3	4.9	4.3	4.3
BLDNG	15.5	17.3	6.7	6.4	5.9	6.0	6.8	5.9	6.0
4B1	17.1	14.2	5.9	5.7	4.9	5.5	5.8	4.9	5.5
4B2	18.9	15.6	6.3	6.1	5.0	6.0	6.2	5.0	6.0
4B3	16.2	13.4	5.7	5.6	4.7	5.3	5.6	4.7	5.3
4B4	15.9	11.6	5.2	4.8	4.7	4.9	5.0	4.7	4.9
4B5	16.2	12.2	5.3	5.1	4.5	5.1	5.1	4.5	5.1
4B6	16.9	13.9	5.7	5.7	4.6	5.6	5.7	4.6	5.6
4B7	13.0	10.6	4.8	4.7	4.2	4.6	4.8	4.2	4.6
4B8	12.6	10.3	4.7	4.6	4.1	4.5	4.7	4.1	4.5
4B9	15.4	13.1	5.6	5.5	4.6	5.2	5.5	4.6	5.2
4B10	14.3	12.2	5.3	5.2	4.4	5.0	5.2	4.4	5.0
RESTAURANT	16.5	14.0	5.9	5.7	4.8	5.5	5.8	4.8	5.5
GAS STATION	13.6	10.6	4.9	4.7	4.3	4.6	4.7	4.3	4.6
4F1	15.1	11.9	5.5	5.8	5.2	5.3	5.4	5.2	5.3
4F2	14.0	11.1	5.3	5.6	5.0	5.1	5.2	5.0	5.1
4F3	13.9	10.0	5.2	5.4	5.0	5.0	5.1	5.0	5.0
4F4	16.6	12.3	5.9	6.1	5.6	5.6	5.7	5.6	5.6
4F5	11.6	8.6	4.6	4.7	4.4	4.5	4.5	4.4	4.5
4F6	14.9	12.0	5.4	5.6	5.1	5.1	5.2	5.1	5.1
MOSCONE	13.0	9.2	5.0	5.2	4.9	4.9	5.0	4.9	4.9
BLDNG2	9.9	7.1	4.1	4.2	4.0	4.0	4.1	4.0	4.0
BLDNG2A	17.6	13.7	6.1	6.2	5.7	5.7	5.8	5.7	5.7
BLDNG2B	13.5	10.3	5.1	5.3	4.9	4.9	5.0	4.9	4.9
GAS	14.4	11.5	5.4	5.8	5.2	5.3	5.4	5.2	5.3
5H1	21.7	12.3	6.9	6.9	6.3	6.8	6.4	6.3	6.8
5H2	22.7	13.1	7.1	7.0	6.8	7.2	6.6	6.8	7.2
5H3	20.7	12.9	6.7	6.8	6.4	6.7	6.2	6.4	6.7
5H4	22.7	12.6	7.2	7.1	6.7	7.2	6.7	6.7	7.2
SCHOOL	7.8	5.9	3.6	3.6	3.5	3.6	3.5	3.5	3.6
2H1	9.5	6.9	3.7	3.7	4.2	3.4	3.7	4.2	3.4
2H2	9.4	6.9	3.7	3.7	4.2	3.4	3.7	4.2	3.4
2H3	9.9	7.3	3.9	3.9	4.3	3.4	3.7	4.3	3.4

been reported at any location in the BAAQMD monitoring network since 1992, and in fact, the Bay Area has been designated as in attainment of the California Ambient Air Quality Standards for CO. (Violations projected by this analysis are a result of the conservative modeling assumptions used.)

The highest 8-hour concentration predicted by CALINE4, including background concentration, was 8.5 ppm at the Harrison/Fourth/on-ramp intersection, under Alternative One (No Build Alternative). This is below the California and Federal AAQS. The location of the maximum concentration is at a curb-side receptor (HF6). The public would not be exposed to this concentration, since this location is not at a sensitive receptor where members of the public would remain for long periods. A high school is located on the same corner as HF6, but the maximum concentration predicted at that location, including the CO background concentration, was 5.0 ppm under the No Build Alternative and Alternative Four.

On The Embarcadero, the highest total 8-hour CO concentration was projected to be 4.9 ppm in 2015. This concentration may occur at receptors P6 -- a promenade receptor south of the Ferry Building under the No Build Alternative, and at Pier 3 under Alternatives Three and Five, Fourth Street Option.

During the AM peak hour in 2015, the highest total 1-hour concentration predicted by CALINE4 was 10 ppm at the Fourth/Folsom intersection under the No Build Alternative and Alternative Three - Fourth Street Option. A total 1-hour concentration of 10 ppm was predicted at the corner of Howard Street and Fifth Street under Alternative Two. During the PM peak hour in 2015, the largest 1-hour concentration was predicted to be 12 ppm at the Harrison/Fourth/on-ramp intersection under Alternatives Four and the No Build Alternative.

Along The Embarcadero in 2015, the maximum AM peak hour concentration was predicted to be 7 ppm at the intersection of Embarcadero/Bryant under Alternatives One (No Build Alternative), Three - Fourth Street Option, Four, and Five - Fourth Street Option. The maximum PM peak hour concentrations along The Embarcadero were 8 ppm at receptor P6 under the No Build Alternative and 8 ppm under Alternatives Three - Fourth Street Option and Five - Fourth Street Option at Pier 3.

The concentrations predicted under Alternative Three compared to Alternative Five were essentially the same under both options, except at receptor JH1 -- located in Justin Herman

Plaza just north of the Ferry Building. At this location, Alternative Five predicted higher CO concentrations. However, concentrations predicted under both Alternatives Three and Five were far below the CO AAQS.

Comparison of 2015 concentrations under the No Build and build alternatives show that generally, the highest CO concentrations would occur under the No Build Alternative. The alternative with generally the lowest CO concentrations was Alternative Three - Second Street Option, followed closely by Alternative Five - Second Street Option.

Other intersections may have a potential for traffic congestion, but possibly not to the extent of the intersections included in the computer modeling (CALINE4) of CO. The intersections of Fifth Street and Market Street, Fifth Street and Folsom Street, and Fifth Street and Mission Street were close to the intersection of Fifth Street and Howard Street. Rather than performing CALINE4 analyses, other parameters were used to analyze the potential CO concentrations at these intersections. If the traffic parameters at these other intersections were likely to result in less traffic or better operation than at Howard and Fifth Streets, then the CO concentrations at these intersections would be lower, also. Similarly, the intersection of Fourth Street and Howard Street was compared to the intersection of Fourth Street and Folsom Street. Table 4.8-5 summarizes the traffic parameters used in this comparison at each intersection.

Comparison of these traffic parameters showed that most likely the CO concentrations predicted using the CALINE4 model at Fifth Street and Howard Street and at Fourth Street and Folsom Street would not be exceeded at the other intersections for any alternative.

To provide a worse case analysis, Carbon monoxide concentrations were predicted for the first year of project operation, known as the Build Year (year 2000). The Build Year has the potential for the highest CO concentrations of any year of operation of the project, since as required by the Federal Clean Air Act Amendments, CO emissions from cars will decrease in the future. From the area that could be significantly affected by the project, six of the "worst" intersections were chosen for the build year analysis. These intersections were chosen based on results of the year 2015 CO analyses, the distance to sensitive receptors, and the Level-of-Service projected for 2015. Because of the similarities between Alternatives Two and Four, and between Three and Five, only Alternatives One (No Build), Two, and Three were analyzed.

TABLE 4.8-5

COMPARISON OF TRAFFIC DATA AT SELECTED INTERSECTIONS (2015)

INTERSECTION	**ALTERNATIVE**				
	1	2	3A[1]	3B[2]	4
AM	**VOLUMES**				
FOURTH/FOLSOM[3]	4110	4084	3918	3948	4102
FOURTH/HOWARD	1483	2938	2900	2920	2956
FIFTH/MARKET	1404	2814	2784	2828	2806
FIFTH/FOLSOM	737	3734	3698	3730	3710
FIFTH/MISSION	1618	3284	3280	3314	3302
FIFTH/HOWARD	3166	3492	3432	3460	3474
	QUEUES				
FOURTH/FOLSOM	5/7[4]	5/5	11/5	12/10	5/5
FOURTH/HOWARD	3/5	2/3	6/4	4/3	2/3
FIFTH/MARKET	9-3/3-3	9-3/3-3	7-3/3-2	10-3/3-3	12-3/3-2
FIFTH/FOLSOM	14/11	11/4	10/10	9/5	11/6
FIFTH/MISSION	14-3/1-2	14-3/1-1	13-5/1-1	13-3/1-1	14-3/1-1
FIFTH/HOWARD	4-15/6	13-4/4	14-3/4	14-4/5	14-3/5
	DELAY/LOS				
FOURTH/FOLSOM	13.8 B	14.5 B	39.1 D	44.8 E	14.8 B
FOURTH/HOWARD	8.1 B	8.4 B	10.9 B	9.8 B	8.0 B
FIFTH/MARKET	19.0 C	20.1 C	18.1 C	20.0 C	20.8 C
FIFTH/FOLSOM	27.9 D	21.8 C	22.2 C	19.8 C	24.7 C
FIFTH/MISSION	29.9 D	26.3 D	28.6 D	26.1 D	27.3 D
FIFTH/HOWARD	38.1 D	33.3 D	34.7 D	32.0 D	35.3 D

Source: Korve (1994)

1 Alternative 3a is the same as alternative 5a at these intersections.

2 Alternative 3b is the same as alternative 5b at these intersections.

3 CALINE4 modeling performed at the "bolded" intersections. Traffic parameters for the other listed intersections were compared to these intersections

4 XX-XX refers to queues on same street (e.g., an eastbound queue and a westbound queue). XX/XX refers to queues on different streets, (e.g., Fourth and Folsom).

TABLE 4.8-5 (continued)

COMPARISON OF TRAFFIC DATA AT SELECTED INTERSECTIONS (2015)

INTERSECTION	**ALTERNATIVE**				
	1	2	3A[1]	3B[2]	4
PM	**VOLUMES**				
FOURTH/FOLSOM	3302	3350	3306	3294	3432
FOURTH/HOWARD	2116	4214	4172	4166	4232
FIFTH/MARKET	1479	2974	2876	3064	2860
FIFTH/FOLSOM	1596	3204	3254	3242	3206
FIFTH/MISSION	1415	3518	3626	3594	3546
FIFTH/HOWARD	4052	3992	4066	4076	3990
	QUEUES				
FOURTH/FOLSOM	14/5	9/5	14/4	13/4	13/4
FOURTH/HOWARD	14/7	14/7	13/4	13/5	14/4
FIFTH/MARKET	11-3/3-4	11-4/3-2	11-3/3-3	9-3/3-3	8-4/3-3
FIFTH/FOLSOM	4/5	4/4	4/3	3/3	4/3
FIFTH/MISSION	4-1/1-3	5-2/1-3	4-1/2-1	5-2/1-2	4-2/1-2
FIFTH/HOWARD	4-5/6	4-5/8	5-3/5	8-4/6	4-4/5
	DELAY/LOS				
FOURTH/FOLSOM	51.3 E	63.1 F	58.2 E	53.0 E	53.2 E
FOURTH/HOWARD	22.7 C	27.8 D	29.1 D	29.0 D	28.9 D
FIFTH/MARKET	22.2 C	29.1 D	22.0 C	20.7 C	21.7 C
FIFTH/FOLSOM	9.0 B	9.3 B	9.0 B	9.3 B	8.9 B
FIFTH/MISSION	4.6 A	4.9 A	4.8 A	5.0 A	4.4 A
FIFTH/HOWARD	15.6 C	23.4 C	15.3 C	15.9 C	16.4 C

Source: Korve (1994)

1 Alternative 3a is the same as alternative 5a at these intersections.

2 Alternative 3b is the same as alternative 5b at these intersections.

Alternative Four was analyzed at one location where queuing was projected to exceed levels expected with Alternative Two.[41]

Table 4.8-6 summarizes the CO concentrations predicted at each intersection for the alternatives analyzed. A violation of the 8-hour California Ambient Air Standard (CAAQS) for CO was predicted under the No Build Alternative (Alternative One) at the intersection of Howard/Fifth (9.4 ppm). Additionally, a violation of the 1-hour CAAQS for CO was predicted under Alternative Four at the intersection of Fourth/Folsom (22 ppm). However, adjustment of signal timing at that intersection to reduce the queue length and increase the green time was shown to lower the maximum one-hour CO concentration to 17 ppm, for Alternative Four. This adjustment would be included in Alternative Four and would not substantially affect traffic circulation or congestion since the overall signal cycle would remain at 60 seconds.

4.8.3 CONSTRUCTION PERIOD AIR QUALITY

For all build alternatives, construction activities would range from 20 months to 21 months in duration, based on the preliminary stage construction plan developed for this project.

Fugitive dust would be emitted during construction of the project alternatives and would be mitigated through application of dust suppression measures. (See mitigation discussion, p. 414.) Table 4.8-7 summarizes the amount of daily fugitive dust as fine particulate matter (PM_{10}) that would be emitted during construction for each alternative, assuming that dust suppression measures have been implemented.

The smallest amount of daily emissions of dust (PM_{10}) would occur under Alternative Two because this alternative would disturb the smallest surface area during construction. The highest fugitive dust emissions would occur during construction of the Fourth Street Option of Alternatives Three and Five. Particulate emissions (after applying control measures) during construction of all alternatives would be below the 68 kg/day (150 lb/day) threshold established by the BAAQMD.

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[41] A more detailed explanation and results of the Build Year air quality analysis are contained in a background report and memorandum which are available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

TABLE 4.8-6

MAXIMUM MODELED CO CONCENTRATIONS (ppm), YEAR 2000

Receptor ID	**Alternative**							
	1		**2**		**3-2nd Street Option**		**3-4th Street Option**	
	Total 1-Hour	**Total 8-Hour**	**Total 1-Hour**	**Total 8-Hour**	**Total 1-Hour**	**Total 8-Hour**	**Total 1-Hour**	**Total 8-Hour**
HARRISON/FOURTH								
HF1	15	N/A	16	N/A	16	N/A	15	N/A
HF2	17	N/A	17	N/A	17	N/A	17	N/A
HF3	18	N/A	17	N/A	18	N/A	19	N/A
HF4	18	N/A	20	N/A	20	N/A	19	N/A
HF5	14	N/A	14	N/A	14	N/A	14	N/A
HF6	19	N/A	19	N/A	19	N/A	19	N/A
HS	12	7.4	12	7.5	12	7.8	12	7.8
AUTO 1	14	8.0	14	8.3	15	8.6	15	8.6
AUTO 2	14	8.0	15	8.3	15	8.6	15	8.5
BLDNG	13	7.7	13	8.0	13	8.1	12	8.0
BUSH/BATTERY								
BB1	13	N/A	13	N/A	13	N/A	13	N/A
BB2	11	N/A	13	N/A	13	N/A	12	N/A
BB3	14	N/A	16	N/A	17	N/A	16	N/A
BB4	12	N/A	12	N/A	13	N/A	12	N/A
BB5	11	N/A	11	N/A	11	N/A	11	N/A
BB6	11	N/A	11	N/A	11	N/A	11	N/A
BB7	12	N/A	11	N/A	12	N/A	11	N/A
BB8	14	N/A	15	N/A	15	N/A	15	N/A
BB9	11	N/A	11	N/A	11	N/A	11	N/A
BB10	9	N/A	10	N/A	10	N/A	9	N/A
BB11	9	N/A	9	N/A	9	N/A	9	N/A
BLDNG1A	11	6.8	10	6.8	11	6.9	11	6.7
BLDNG1B	10	6.4	10	6.4	10	6.5	10	6.4
BLDNG2	10	6.6	11	6.8	11	6.9	11	6.7
PARK	9	6.2	10	6.5	10	6.5	10	6.4
DONUT	13	8.3	13	8.6	14	8.9	13	8.5
BAGEL	10	7.8	11	8.1	11	8.0	11	8.0
HOWARD/FIFTH								
5H1	15	N/A	13	N/A	13	N/A	13	N/A
5H2	15	N/A	14	N/A	14	N/A	13	N/A
5H3	15	N/A	13	N/A	13	N/A	13	N/A
5H4	15	N/A	13	N/A	13	N/A	13	N/A
5H5	17	N/A	15	N/A	15	N/A	15	N/A
5H6	18	N/A	16	N/A	17	N/A	16	N/A
SCHOOL	8	4.7	8	4.6	8	4.6	8	4.6
BURL	8	4.8	7	4.7	7	4.6	7	4.6
P.LOT	13	8.2	12	7.5	12	7.5	12	7.5
BLDNG	15	9.4	13	8.7	14	8.4	13	8.4

CONTINUED...

TABLE 4.8-6 (continued)

MAXIMUM MODELED CO CONCENTRATIONS (ppm), YEAR 2000

Receptor ID	Alternative							
	1		2		3-2nd Street Option		3-4th Street Option	
	Total 1-Hour	Total 8-Hour	Total 1-Hour	Total 8-Hour	Total 1-Hour	Total 8-Hour	Total 1-Hour	Total 8-Hour
BRYANT/FOURTH								
4B1	12	N/A	12	N/A	13	N/A	12	N/A
4B3	12	N/A	12	N/A	13	N/A	12	N/A
4B4	11	N/A	12	N/A	11	N/A	11	N/A
4B5	11	N/A	11	N/A	11	N/A	11	N/A
4B6	12	N/A	12	N/A	14	N/A	12	N/A
4B7	10	N/A	10	N/A	10	N/A	10	N/A
4B8	10	N/A	10	N/A	10	N/A	10	N/A
4B9	11	N/A	11	N/A	12	N/A	11	N/A
4B10	11	N/A	11	N/A	12	N/A	11	N/A
4B2/HOTEL	12	8.0	12	8.0	13	8.3	12	8.3
RESTAURANT	11	7.2	11	7.2	12	7.0	11	7.4
GAS STATION	10	6.6	10	6.6	11	7.1	10	7.0
FOLSOM/FOURTH								
4F1	18	N/A	19	N/A	19	N/A	19	N/A
4F2	18	N/A	19	N/A	19	N/A	19	N/A
4F3	17	N/A	17	N/A	17	N/A	17	N/A
4F4	17	N/A	18	N/A	18	N/A	18	N/A
4F5	12	N/A	12	N/A	12	N/A	12	N/A
4F6	13	N/A	14	N/A	12	N/A	13	N/A
MOSCONE	7	4.5	8	4.6	7	4.5	7	4.5
BLDNG 2	8	5.0	9	5.1	9	5.1	8	5.0
BLDNG 2A	9	4.9	9	5.0	9	5.1	9	5.0
BLDNG 2B	9	5.1	10	5.2	10	5.3	9	5.1
GAS	12	7.3	12	7.5	12	7.5	12	7.4
BRYANT/STERLING								
BS2	7	N/A	7	N/A	12	N/A	7	N/A
BS4	7	N/A	7	N/A	11	N/A	7	N/A
BS5	7	N/A	7	N/A	9	N/A	7	N/A
BS6	7	N/A	7	N/A	8	N/A	7	N/A
BS7	7	N/A	7	N/A	8	N/A	7	N/A
BS1/BLDN	7	4.1	7	4.1	10	5.0	7	4.3
BS3/BLDN	7	4.1	7	4.1	8	4.6	7	4.2
WAREHOUSE	7	4.2	7	4.2	10	5.3	7	4.3
BLDNG	7	4.2	7	4.2	8	4.7	7	4.3

Source: Woodward-Clyde Consultants, December 1994. Robbi S. Keil, Consultant, December 1994.

1. National Ambient Air Quality Standards - 1-hour = 35 ppm, 8-hour = 9 ppm
   California Ambient Air Quality Standards - 1-hour = 20 ppm, 8-hour = 9.0 ppm
   Underlined values exceed either the NAAQS and/or CAAQS.
2. Eight-hour concentrations were evaluated using the CALINE4 8-hour multi-run option.
3. The background CO levels were 5.5 ppm (1-hour) and 3.7 ppm (8-hour).
4. Receptors showing "N/A" are sidewalk receptors for which only 1 hour maximum CO concentrations were calculated.

TABLE 4.8-7

CONSTRUCTION PHASE (1998-2000): FUGITIVE DUST EMISSIONS FINE PARTICULATES[1]

	PARTICULATE EMISSIONS[2]			
	Construction Stage 1[3]	Construction Stage 2	Construction Stage 3	Construction Stage 4
Alternative	Kg/Day	Kg/Day	Kg/Day	Kg/Day
2	2	33	39	15
3a	10	46	55	30
3b	15	46	55	30
4	2	33	41	17
5a	10	45	55	30
5b	15	45	55	30

Source: Jonas and Associates. 1994. Air Quality Background Report: Air Quality Impact Analysis.

[1] Fine particulates refer to PM_{10}, particulate matter with diameters less than 10 micron.

[2] Assumes mitigation measures described in Section 6 would be in place. Consequently, the emissions shown in this table are 75 percent less than without mitigation measures. PM_{10} comprise 65 percent of total suspended particulate matter (TSP).

[3] Typical tasks completed in stage 1 include removing portions of curbs and gutters and constructing temporary roadways. Typical tasks completed during stage 2 include construction of temporary and permanent roadways. Typical tasks completed during stage 3 include construction of permanent roadway. Typical tasks completed during stage 4 includes urban design and construction of medians and curbs. For all build alternatives (2 through 5), the durations of each stage would be 2 to 4 months (stage 1), 8 to 10 months (stage 2), 8 to 10 months (stage 3) and 6 to 8 months (stage 4).

During construction activities, various equipment such as backhoes, trucks, dozers, concrete trucks, excavators, pile drivers, compressors, pumps, and generators would emit air pollutants.

Projected pollutant emissions from construction equipment exhaust are summarized in Table 4.8-8. Emissions from the equipment used for construction of all alternatives would be below the BAAQMD 68 kg/day (150 lb/day) threshold for emissions of sulfur oxides, hydrocarbons and particulate, and below the 249 kg/day (550 lb/day) threshold for CO. Project-wide maximum daily emissions of nitrogen oxides (NOx) would be above the threshold during construction of all build alternatives during one or more stages of construction. The peak day during the entire construction phase would occur less than one percent of the time. The peak day during each month of construction would occur less than 20 percent of the time during that month, and those construction phases would last substantially less than five years.

Total PM_{10} emissions from construction equipment exhausts when combined with the fugitive dust emissions described above would also lower than 68 kg/day (150 lbs/day) during construction of all build alternatives.

Analyses of soil samples in the project area have found the presence of toxic compounds (Baseline 1994). The maximum potential concentrations of these compounds in the air (i.e. as fugitive dust) were calculated and compared to odor thresholds and Reference Exposure Levels (REL's) as published by the Toxics Committee of the California Air Pollution Control Officers Association (CAPCOA 1993). Table 4.8-9 summarizes the predicted airborne concentrations of toxics contained in the soil samples that had REL's. None of these substances were listed as odor-producing compounds. (Lemar Das, 1968.)

These airborne concentrations, which were derived using the maximum concentrations found in any of the soil samples, could occur near the southern end of the Embarcadero, between Howard Street and Folsom Street under all of the build alternatives. Other soil samples at other locations had much less contamination. If control measures for reducing construction dust are followed, then all compounds are expected to fall below CAPCOA REL's (CAPCOA 1993), except for annual exposure to chromium emissions up to 4 meters (13 feet) from the construction site. However, no sensitive receptors would remain within that distance for annual exposure. Also, total chromium concentrations were projected to be over the CAPCOA REL for hexavalent chromium, but typically hexavalent chromium in the soil is a fraction of the total chromium.

TABLE 4.8-8

MAXIMUM DAILY DIESEL CONSTRUCTION EQUIPMENT EMISSIONS FOR EACH ALTERNATIVE

CONTAMINANT	KILOGRAMS/DAY							
	ALTERNATIVES							
	2 and 4				3 and 5 (2nd and 4th Street Options)			
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 1	Stage 2	Stage 3	Stage 4
PARTICULATE (PM_{10})	1	3	5	4	4	5	5	4
CARBON MONOXIDE (CO)	6	12	22	16	19	23	22	17
HYDROCARBONS (HC)	3	6	12	9	10	12	12	9
NITROGEN OXIDES (NO_x)	23	46	84	62	71	88	86	65
SULFUR OXIDES (SO_x)	3	5	10	7	8	10	10	7

SOURCE: Emission factors (BAAQMD, 1985 updated 1991)
Fuel usage (Department of Public Works, 1994)
Equipment usage (Parsons Brinckerhoff, 1994)
Jonas and Associates. 1994. Technical Report: Air Quality Impact Analysis.

1 Typical tasks completed in stage one include removing portions of curbs and gutters and constructing temporary roadways. Typical tasks completed during stage two include construction of temporary and permanent roadways. Typical tasks completed during stage three include construction of permanent roadway. Typical tasks completed during stage four include urban design and construction of medians and curbs. For all build alternatives (Two through Five), the durations of each stage would be two to four months (stage one), eight to ten months (stage two), eight to ten months (stage three) and six to eight months (stage four).

2 Underlined values exceed BAAQMD significance thresholds of 68 kg/day (249 kg/day for CO).

TABLE 4.8-9

AIRBORNE CONCENTRATIONS OF HAZARDOUS SUBSTANCES IN SOIL RELEASED DURING CONSTRUCTION ACTIVITIES

Substance	**Maximum Concentration in Soil**[1]	**CAPCOA Reference Exposure Level**[2]		**Maximum Airborne Concentration (Mitigated emissions)**[1]	
		1-hour	Annual	1-hour	Annual
	mg/kg	ug/m^3	ug/m^3	ug/m^3	ug/m^3
Arsenic	1.50E-04	--[4]	5.0E-01	--	8.0E-04
Beryllium	2.42E-06	--	4.8E-03	--	1.3E-05
Cadmium	6.20E-06	--	3.5E+00	--	3.3E-05
Total Chromium[5]	7.70E-04	--	2.0E-03	--	4.1E-03[5]
Copper	1.84E-02	1.0E+01	2.4E+00	2.9E+00	9.8E-02
Mercury	2.40E-04	3.0E+01	3.0E-01	3.8E-02	1.3E-03
Lead	4.30E-03	--	1.5E+00	--	2.3E-02
Nickel	2.68E-03	1.0E+00	2.4E-01	4.3E-01	1.4E-02
Selenium	2.00E-06	2.0E+00	5.0E-01	3.2E-04	1.1E-05
Zinc	1.01E-03	--	3.5E+01	--	5.4E-03
Volatile Organic Compounds[7]	1.20E-04	1.9E+02	2.4E+00	1.9E-02	6.4E-04
Semi-Volatile Organic Compounds[8]	5.40E-05	--	1.2E+00	--	2.9E-04

Source: Jonas and Associates. 1994. Air Quality Background Report: Air Quality Impact Analysis.

[1] As provided in the Hazardous Materials Background Report, Table 2.2 (Baseline 1994).

[2] Source: California Air Pollution Control Officers Association (CAPCOA) 1993

[3] Emissions reduced by 75 percent assuming control of fugitive dust.

[4] No CAPCOA Reference Exposure Levels were published for those entries of '–'.

[5] Soil samples were analyzed for total chromium. CAPCOA Reference Exposure Levels are for hexavalent chromium.

[6] Annual average airborne concentration of chromium falls below CAPCOA Reference Exposure Level 4 meters (13 feet) from the construction area. No sensitive receptors would be within 4 meters (13 feet) of construction for an extended period of time.

[7] Total concentration of all Volatile Organic Compound (VOC) concentrations in soil were compared to the most stringent CAPCOA Reference Exposure Level for those VOC's found in the soil (i.e., carbon tetrachloride).

[8] Total concentration of all Semi-Volatile Organic Compound (Semi-VOC) concentrations in soil were compared to the most stringent CAPCOA Reference Exposure Level for those Semi-VOC's found in the soil (i.e., polychlorinated biphenyls).

Air Quality Mitigation Measures

- To reduce construction period PM_{10} emission levels by 75 percent (BAAQMD 1985, updated 1991), the City would require project contractors to implement dust control measures. Measures to reduce dust include watering construction areas, covering haul trucks and storage piles containing dirt and debris, imposing a speed limit in the construction area, paving the area as quickly as possible, and planting the non-paved areas as soon as possible.

  Ordinance 175-91, passed by the San Francisco Board of Supervisors on May 6, 1991, requires that non-potable water be used for dust control activities. Therefore, the City would require that the project contractor(s) obtain reclaimed water from the Clean Water Program for this purpose.

- To reduce Exhaust emissions during construction, the City would require that private contractors not allow the equipment to idle unnecessarily, keep the engines well-tuned, and use newer equipment.

4.9 CLIMATE

4.9.1 SHADOW

Under the No Build Alternative and the all build alternatives, the overall size and duration of shadows that would be produced by the project would be less than that cast by the pre-earthquake elevated Embarcadero Freeway/TSS structures. Compared to existing conditions, Alternatives One and Two would create no new shadows, since there would be no new structures above grade. Alternatives Three, Four, and Five would create minimal new shadows produced by the modification and construction of freeway access ramps.

Section 295 of the San Francisco City Planning Code was adopted in response to Proposition K (passed November 1984) in order to protect certain public open spaces from shadowing by new structures during the period between one hour after sunrise and one hour before sunset, year round. Section 295 restricts new shadow upon public spaces under the jurisdiction of the Recreation and Park Department by any structure exceeding 12 meters (40 feet) unless the City Planning Commission finds the impact to be insignificant.

Open spaces in the vicinity of the project presently subject to Proposition K, the Sunlight Ordinance, include: Justin Herman Plaza, Maritime Plaza and one-half of Assessor's Block 202. The rest of Block 202 and the majority of Block 203 are maintained by the San Francisco Recreation and Park Department but are under the primary jurisdictions of the City's Department of Real Estate following their transfer from State ownership. The Promenade is not subject to Proposition K, and Rincon Point Park would not be subject to Proposition K. No elevated structures are proposed within the vicinity of any Proposition K open spaces.

Compared to pre-earthquake conditions, the No Build Alternative and the build alternatives would result in the reduction of shadows along the Embarcadero and TSS corridors. Shadows cast by the Embarcadero Freeway on large areas of the Embarcadero corridor, including Justin Herman Plaza and the Assessor's block 202 have been eliminated by removal of the elevated freeway. Shadows cast by the Terminal Separator Structure over large areas under and near the alignment (including the southern half of the three block area bounded by Main, Folsom , First and Howard Streets, the southeast corner of the block bounded by First, Folsom ,, Second and Howard Streets, and one half of the block bounded by Essex, Harrison, Second and Folsom Streets) have been eliminated with the removal of the TSS. Shadows cast by the Beale Street off-ramp and the Main Street on-ramp have been eliminated with the removal of these ramps. Remaining shadows are cast by the I-80 freeway and the Fremont Street off-ramps (which depart I-80 westbound just south of Harrison Street near Essex Street, and the elevated Transbay Terminal ramps close by.

Alternatives Three, Four and Five would realign of the existing Fremont Street off-ramp so that it would curve away from the existing alignment at First Street toward the southeast, flaring to Folsom Street. The modified off-ramp would cast shade under and near the new alignment at various times of the day and year. These shadows would be smaller and of shorter duration when compared to pre-earthquake conditions and virtually identical to existing conditions. Users affected by the new shadow would be limited to those using the vacated right-of-way in that block.

Alternatives Three and Five would construct a new two-lane westbound on-ramp to I-80 westbound at Harrison Street near Essex Street. The ramp would start from the Harrison Street and Essex Street intersection, and would cross Second Street south of Harrison Street. The double-decked, pre-earthquake connection between The Embarcadero and I-80 shaded this area during much of the mid-day hours. Because the proposed on-ramp would be lower, smaller, and would not cross Harrison Street, it would produce fewer shadow impacts than the pre-earthquake connector. Compared to existing conditions, the new on-ramp would produce more shade, particularly as it crosses Second Street. Users affected by the new shade would be pedestrian and vehicular users along Second Street between Harrison Street and Bryant Street, who would experience areas of shade contiguous with that cast by I-80 at the mainline freeway various times of the day and year. The additional shade produced by the project would be barely noticeable, given the presence of the much larger (shadow-generating) freeway immediately to the south.

The Second Street Option of Alternative Three and Five would construct a new off-ramp from the elevated eastbound freeway (I-80 east) to Second Street along the Stillman Street alignment. The off-ramp would flare to three lanes at Second Street. To accommodate the off-ramp, the existing elevated freeway would be widened on the south side by about 3.6 meters (12 feet). This would shade the parking lot under the new off-ramp. Additional shade would be cast to the north of the off-ramp, an area which is already shaded by the mainline freeway. As a result, the only users affected by this new shade would be users of the parking lot. The change would be minimal compared to existing and pre-earthquake conditions.

The Fourth Street Option of Alternative Three and Five would modify the existing Fourth Street off-ramp from I-80 east to provide two dedicated exit lanes. Ramp widening would be approximately 350 meters (1160 feet) long between Sixth and Fourth Street Streets, measuring from the gore point westward. This would add one 3.6 meter (12 feet) lane and expand the shoulder from the current 1.2 meters (4 feet) to 2.4 meters (8 feet), a 4.8 meter (16 feet) widening in total. New shadows cast under the modified portion of the off-ramp would be produce a minimal change compared to the pre-earthquake and existing conditions. Users affected by the new shade would be pedestrian and vehicular users on Sixth and Fifth Streets near Bryant, and users of the parking lots under the freeway north of Bryant Street in the vicinity of Fifth Street, who would experience areas of shade contiguous with that cast by I-80 at various times of the day and year. The additional shade produced by the project would be barely noticeable compared to existing and pre-earthquake conditions.

Demolition of The Embarcadero Freeway and the Terminal Separator Structure created newly available building sites along the Caltrans right-of-way. Structures on these sites could be substantially taller than the freeway structures proposed by any of the alternatives. Any buildings constructed on these sites would have shadow impacts, and any private or City-owned building over 12.2 meters (40 feet) high would be subject to future shadow studies under Section 295 of the San Francisco City Planning Code. Future environmental studies for proposed structures on these sites would give detailed attention to their shadow impacts, which could affect the structures' ultimate size and configuration.

4.9.2 WIND

A project may affect the wind environment and pedestrian comfort directly and indirectly. Direct effects are those related to physical changes in climate conditions such as an acceleration in ground-level winds. Indirect impacts are related to changes in use that change the exposure of pedestrians to climatic conditions, e.g., creation of new pedestrian facilities or public plaza that will attract people who will be affected by the prevailing conditions.

Winds were undoubtedly increased somewhat when the sheltering effect of the Embarcadero Freeway and the TSS were removed, but the effect of slightly stronger winds on comfort were offset by increased sunlight reaching pedestrian areas. In the 2015 “future context”, the No Build Alternative would not create any structures or elements capable of accelerating winds, and would not create new pedestrian facilities subject to adverse conditions.

None of the build alternatives would create any structures or elements within the Embarcadero corridor capable of accelerating winds, but would all create new pedestrian facilities along the Embarcadero corridor and in front of the Ferry Building. Winds in the project area are generally light and ambient temperatures are mild due to the climatic influence of the Bay. The addition of landscaping and trees is likely to reduce winds in localized areas, with generally positive effects on pedestrian comfort.

Realignment of the existing Fremont Street off-ramp to the Fremont and Folsom Street intersection under Alternatives Three, Four and Five would be likely to change winds in the immediate vicinity. Some areas would become more exposed to winds while other areas would be more sheltered, but the realignment would have an overall neutral effect on winds and comfort.

The proposed I-80 on-ramp at the Harrison Street and Essex Street intersection under Alternatives Three and Five and the I-80 off-ramp at Second Street under the Second Street Options of Alternatives Three and Five would cause some shifts in the winds nearby. Some areas would experience increased winds, while other areas would experience decreased winds. These new roadway elements would not be large enough to create adverse wind accelerations, and would have an overall neutral effect on wind and comfort.

The proposed widening of the Fourth Street I-80 eastbound off-ramp under the Fourth Street Option of Alternatives Three and Five would have no effect on winds or comfort.

The new pedestrian facilities created in front of the Ferry Building under all alternatives would be in an area with generally good comfort conditions due to the sheltering effect of large high-rises to the west. The addition of landscaping and trees would be likely to reduce winds in localized areas, with generally positive effects on pedestrian comfort.

4.10 BIOLOGICAL RESOURCES

Except for landscaping in Justin Herman Plaza and vicinity, the proposed project area is generally paved with concrete and asphalt. Although the proposed project lies adjacent to the San Francisco Bay, no project alternatives would require any filling of wetlands, nor would any alternative have any effect on wetlands or water quality. (Also see Section 4.12.) According to the U.S. Fish and Wildlife Service there are no listed or proposed species within the area of the project. (See USFWS letter in the Comment and Coordination section.)

During construction of all build alternatives, movements of machinery and irregular noises from construction equipment would cause slight disturbance to any wildlife in the area, although those species that use the area are adapted to urban conditions and would generally adapt to the temporary changes. Two special status species are found in the adjacent San Francisco Bay waters, the Brown Pelican and Double-crested Cormorant. The Double-crested Cormorant feeds off-shore of the project area and nests on the Bay Bridge. Brown Pelicans and Double-crested Cormorants are adapted to urban conditions and would not be affected by construction or operation of any of the alternatives.

The Black-Crowned Night Heron is a wading bird and would not be expected to hunt in proximity to the proposed project and thus would not be affected. The Peregrine Falcon nests, roosts, and hunts high above the ground, and would therefore also not be affected by construction activity by the constructed project[42].

4.11 TOPOGRAPHY, GEOLOGY, SOILS, AND SEISMICITY

4.11.1 TOPOGRAPHY

None of the build alternatives would result in appreciable permanent effects on the topography and ground surface features in the Embarcadero corridor. Ground surface would essentially remain at Elevation 0. Construction of Alternatives Three and Five would result in elevated ramps along the former TSS alignment, and all build alternatives would involve some excavation, therefore resulting in temporary changes in topography during construction.

4.11.2 DEWATERING

To date, no plans are available for new utilities in any of the build alternatives although a new storm water collection system would be installed on the Bay side of the Embarcadero roadway under all the build alternatives. It is anticipated however that dewatering may be required to install utility appurtenances such as manholes and catch basins, if invert elevations of these structures extend below the water table. Dewatering would probably be achieved by lowering pumps directly into the affected excavations. Dewatering is not anticipated for foundation and roadway subgrade excavations along the TSS and Embarcadero corridors because of the proposed shallow depths of these excavations.

4.11.3 EXCAVATION

For all build alternatives, excavations for the roadway subgrade preparation, the removal of existing freeway pile caps, and the installation of stormwater collection appurtenances may require excavations on the order of 1 to 2-1/2 meters (3 to 8 feet) deep. These excavations would be sloped back or shored by cantilevered or braced shoring systems.

Excavation for each of the build alternatives would encounter both functional and abandoned utilities such as sewer, water, telephone, and gas lines, and their related appurtenances such as manhole and vault boxes. Utilities that are pile-supported in their present locations would experience differential settlement if they were relocated and not pile-supported. Utilities that are not relocated would require protection during construction. As-built utility drawings and a pre-construction survey of utilities would be used to determine utility locations and elevations.

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[42] "Biological resources Technical Memorandum," Michael S. Marangio, Baseline Environmental Consulting, 1993. A copy of the technical memorandum is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

To reduce the possibility of differential settlement affecting relocated utilities, the relocated segments of previously pile-supported utilities would also be pile-supported where possible. Where appropriate, flexible connections would be used to mitigate the impact of differential settlement of pile-supported and non-pile-supported segments. Temporary support during excavation would provide for utilities which are within the alignment of proposed roadways, but which would not be relocated. (See mitigation section, p.423.)

The excavations required during the construction of Alternatives Two through Five would likely encounter remnants of the foundations for the demolished freeway. These foundations are within 1 to 1.5 meters (3 to 5 feet) of existing grade. As-built drawings (including demolition plans), and a pre-design/pre-construction survey would confirm the locations of existing foundations so that they do not become obstructions during installation of new foundations.

4.11.4 SETTLEMENT OF NEW AND EXISTING STRUCTURES

In the TSS alignment, ramp construction and modification and freeway widening (Alternatives Three, Four and Five) would likely be supported on pile foundations or on spread footings founded in very dense sand or rock. If properly designed and constructed, these foundations would not experience appreciable settlement. Roadway improvements along The Embarcadero, under all build alternatives, would not add any new loads; and new consolidation settlement of the bay mud in this area is not expected.[43] A comprehensive exploration and testing program would be carried out prior to construction, in order to determine engineering soil properties, to determine new foundation types, and to estimate foundation settlements. (See mitigation section, p. 423.)

Most of the fill materials above the bay mud have been in place for over 80 years and consolidation of the bay mud under the weight of this fill has caused several feet of settlement during this time. Minor settlement because of secondary compression of the mud will continue, and it is expected to be on the order of several inches. This settlement would occur under all alternatives, including Alternative One, the No Build.

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[43] For more details regarding soil conditions and potential ground settlement, see the July 1994 Geotechnical and Seismic Background Report. A copy of this report is available for review in the project case file at the SF Planning Department, 1660 Mission Street, San Francisco.

Foundations of existing structures that are adjacent to new construction may experience settlement due to construction activities such as pile driving. Where structures are pile-supported, settlement would be small and their foundations would not be adversely affected. Pile driving and other construction activities that impart vibrations to the ground could cause structural damage to, and foundation settlement of nearby buildings and utilities. Older buildings in poor shape that are not pile-supported and buildings supported on deteriorated piles could suffer structural damage such as cracking if the ground vibrations beneath and adjacent to the structures become too high.

A pre-construction survey of existing structures adjacent to the project area would be performed to determine their foundation conditions. If appropriate, improvements to mitigate loose or poor soil conditions under existing structures would be performed, including compaction and chemical grouting or underpinning of these structures. During construction, survey points would be installed on adjacent buildings where necessary to monitor their movements. A survey to locate existing utilities, piles, and other subsurface structures in the project area would be performed prior to designing and constructing new pile foundations. (See mitigation section, p. p. 423.).

4.11.5 SEISMIC CONSIDERATIONS

During construction and subsequently during operation of any of the alternatives, the project area may be subject to strong ground-shaking from earthquakes. Since no known faults traverse the project site, ground rupture is not expected; however, ground failure associated with densification or liquefaction could occur. Ground failure could manifest as vertical settlement, lateral spreading, ground waviness, or as a combination of these phenomena.

Except for the westernmost portion of the TSS alignment which intersects the filled Sullivan Marsh area, no major damage was recorded along the alignment during the 1906 San Francisco earthquake. Three types of ground disturbance were observed along The Embarcadero during the 1906 earthquake; namely, settlement, lateral spreading and ground waviness. Differential settlement was evidenced by cracking, unevenness in streets, and settlement in ground-abutting structures that were supported on pile foundations extending below the fill. There were no reports indicating that sea wall failures or landsliding into the Bay had occurred along the waterfront. Also, there were no reports indicating that pile-supported structures along the waterfront, such as the Ferry Building, were significantly shifted out of position during the earthquake.

Although ground failures were reported further west in the eastern lobe of the Sullivan Marsh area, there were no reports of failure along the TSS alignment associated with the 1989 Loma Prieta Earthquake. Ground disturbances along The Embarcadero associated with the 1989 Loma Prieta Earthquake were small compared with the effects of the 1906 earthquake. Differential settlement and lateral displacement during Loma Prieta were observed along The Embarcadero from Howard Street to just north of the Ferry Building, with magnitudes measured in inches.

The fill underlying the proposed alignments is the soil unit which has the potential to behave adversely during a major earthquake. The fill in some locations along the TSS is loose, and could densify from ground shaking during a seismic event. However, liquefaction is not expected except near the eastern end of the TSS alignment, where the fill is partly submerged. Because the fill beneath the Embarcadero alignment is generally loose granular soil, and is saturated below a depth of about 2.5 meters (8 feet), liquefaction of the submerged portion of the fill during a Maximum Credible Earthquake (MCE) of 8.3 is probable. The bay mud underlying the fill contains sand lenses. Some of the lenses are reported to be clean sand, and they could possibly liquefy. Based on the available data, the lateral extent of clean sand lenses in the bay mud is limited, so the amount of lateral movement possible due to their liquefaction would be small.

Since the weak bay mud has gained slightly in strength due to consolidation, and the overlying fills have likely experienced some densification during past earthquakes, it is reasonable to expect that permanent ground displacements during a future MCE may be somewhat less than those which occurred during the 1906 earthquake. The placement of deep foundations and ancillary ground improvements would further reduce the magnitude of future ground displacements. Also, construction of projects such as the MUNI Metro Turnaround would likely increase the resistance to Bayward lateral movements in the project area during the MCE.

Potential ground movements (settlement and lateral spreading) during the MCE have been estimated for the project area, and are shown on Figures 4.11-1 through 4.11-4. Movements were estimated based on theoretical analyses and compared with actual movements observed in the area in previous earthquakes[44]. In the vicinity of the TSS, estimated future settlements range from 0 to 0.5 meters (1.5 feet), while lateral displacements range from 0 to 0.2 meters (less than 1 foot). Settlement estimates along the Embarcadero range from 0 to 0.6 meters (2 feet) and estimates of lateral displacement range from 0 to 0.3 meters (1 foot). These predictions are generalized and do not consider the local effects of soil conditions, structures, or ground modifications that have been or could be performed.

State-of-the-art practice would be used during design of the project. However, even with the use of modern design and construction techniques, surface roadways and elevated structures would probably incur repairable structural damage and misalignments during a MCE. The surface roadways in all alternatives would be repaired by crack filling, releveling and realigning. Most of the distress would probably occur in transition areas (between surface and elevated portions). These areas connect distinctly different structural elements that would be subject to variable foundation conditions. For Alternatives Three, Four, and Five, the design of shallow spread footings and deep pile foundations would consider the potential ground deformations.

Mitigation Measures

- To reduce the possibility of differential settlement affecting relocated utilities, the relocated segments of previously pile-supported utilities would also be pile-supported where possible. If appropriate, flexible connections would be used to mitigate the potential impact of differential settlement of pile-supported and non-pile supported segments. Temporary support during excavation would be provided for utilities which are within the alignment of proposed roadways, but which would not be relocated.

- A comprehensive exploration and testing program would be carried out prior to construction, in order to determine engineering soil properties, to determine new foundation types, and to estimate foundation settlements.

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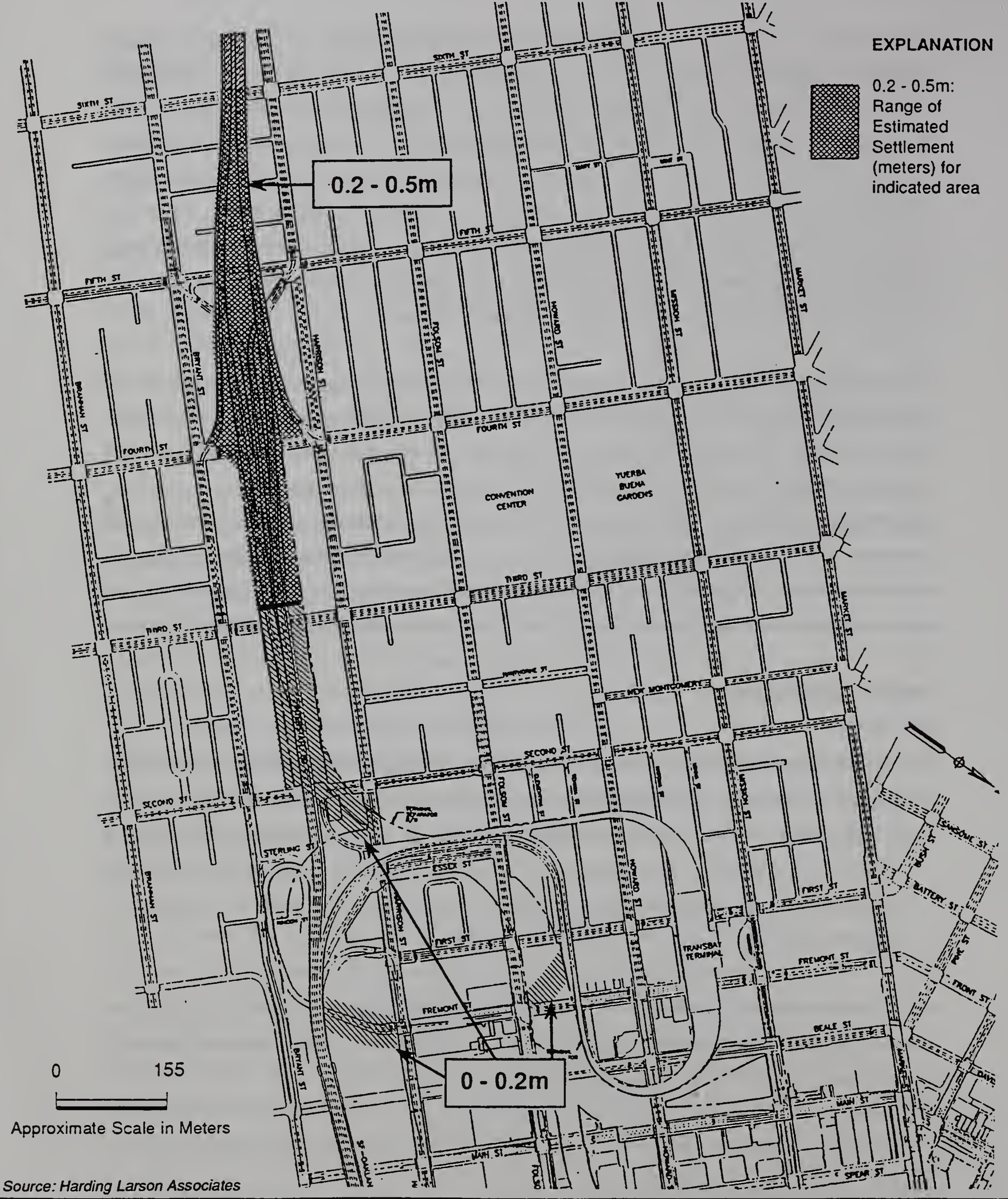
[44] Harding, Lawson Associates, et al, "Final Report Liquefaction Study, North Beach, Embarcadero Waterfront, South Beach, and Upper Mission Creek", 1992, San Francisco, California

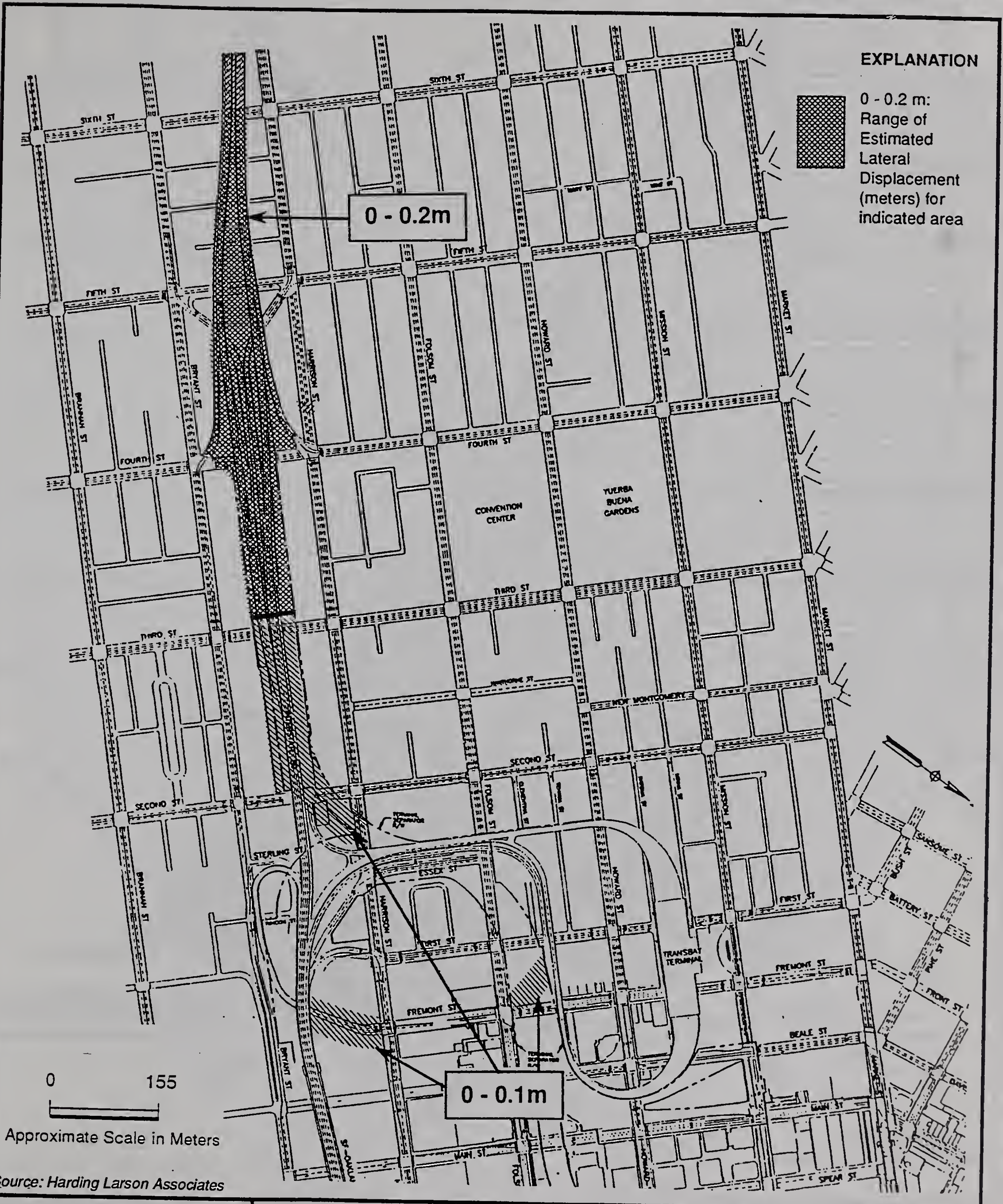


Source: Harding Larson Associates

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure

Estimated Settlements Due to Liquefaction in Terminal Separator Area

Figure 4.11-1

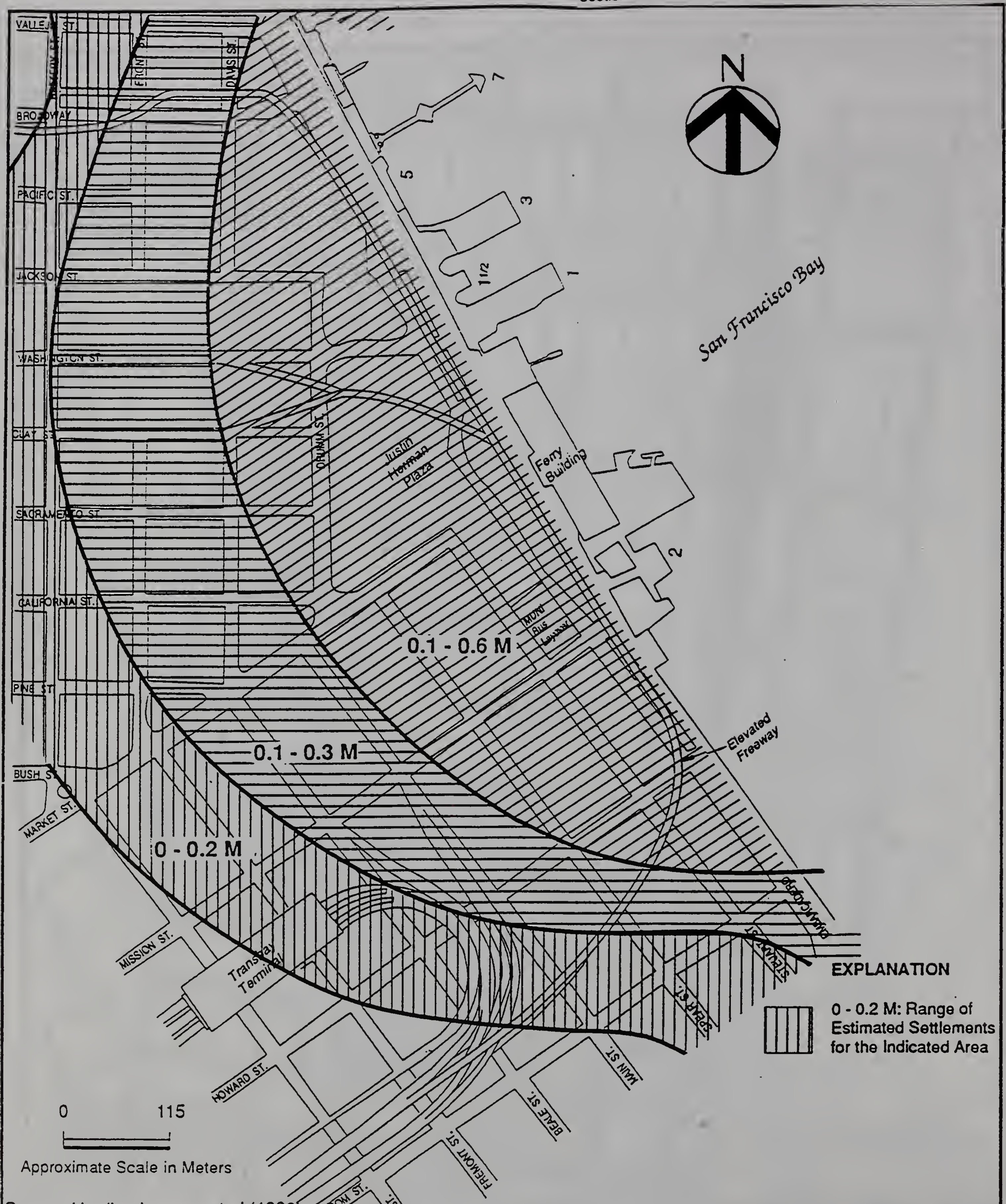


Source: Harding Larson Associates

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure

Estimated Lateral Displacements Due to Liquefaction in Terminal Separator Area

Figure 4.11-2

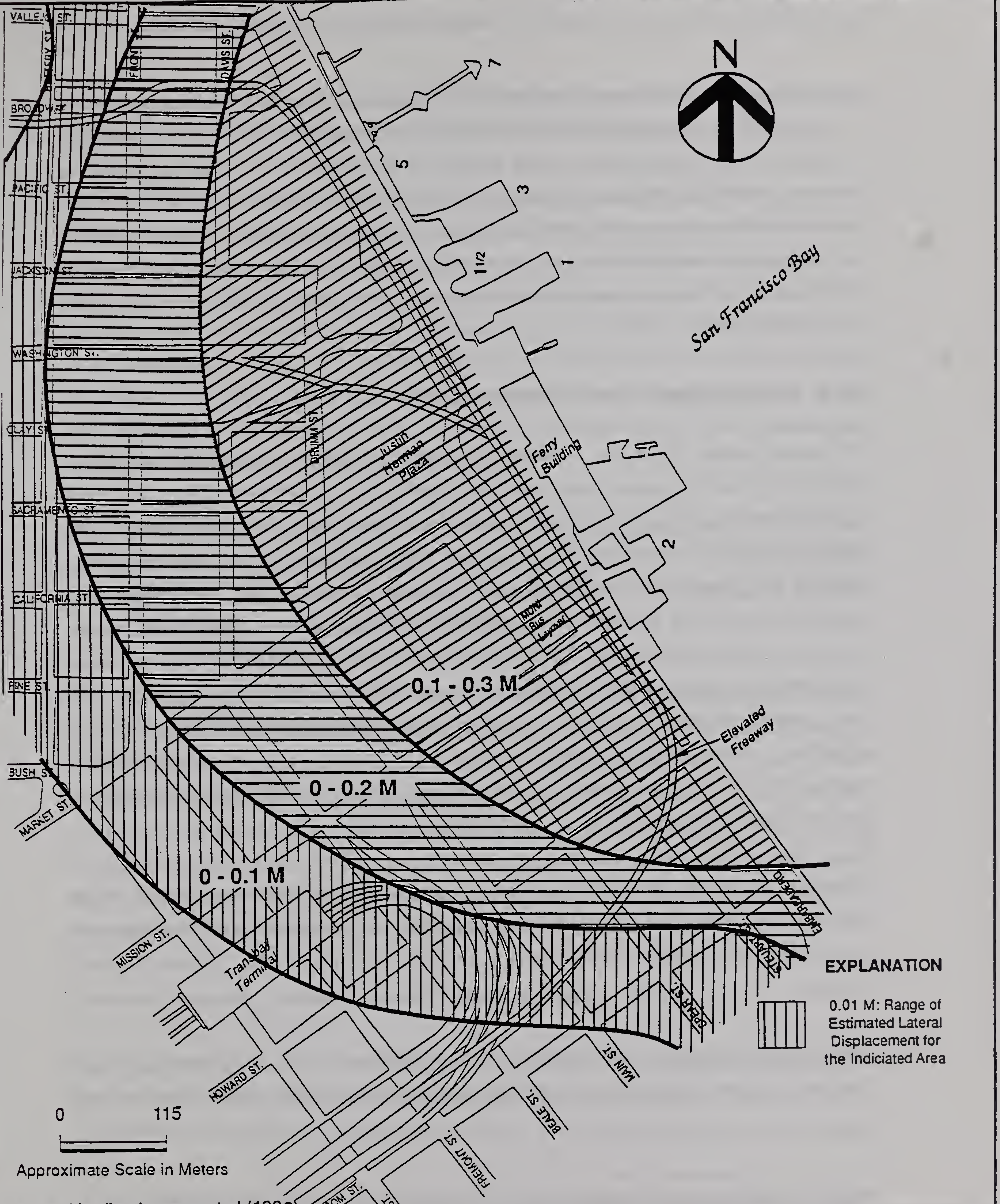


Source: Harding Lawson et al (1992).

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure

Estimated Settlements Due to Liquefaction in Embarcadero Waterfront Area

Figure 4.11-3



Source: Harding Lawson et al (1992)

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure

Estimated Lateral Displacements Due to Liquefaction in Embarcadero Waterfront Area

Figure 4.11-4

- A pre-construction survey of existing structures adjacent to the project alignment would be performed to determine foundation conditions. If appropriate, improvements to mitigate loose or poor soil conditions under existing structures would be performed, including compaction and chemical grouting or underpinning of these structures. During construction, survey points would be installed on adjacent buildings where necessary to monitor their movements. A survey to locate existing utilities, piles, and other subsurface structures in the project area would be performed prior to designing and constructing new pile foundations.

4.12 HYDROLOGY AND WATER QUALITY

The surface waters of the San Francisco Bay and groundwater underlying the study area constitute the receiving waters which could be affected by the project alternatives. The Water Quality Control Plan (Plan) for the San Francisco Bay Basin Region was first adopted by the RWQCB in 1975 and amended most recently in 1986 to implement State and Federal laws requiring the preservation and enhancement of water quality.[45] The Plan identifies the beneficial uses of water and water quality objectives for resources within distinctive subregions of the San Francisco Bay Region. The beneficial uses identified by the RWQCB for the Central Bay include industry, navigation, recreation, fishing, and habitat/species preservation. The water quality objectives specifically identify maximum contaminant concentrations for the protection of human health and aquatic life for the groundwater and saline marine surface waters of the Bay. The groundwater in the area of the project site is brackish and is not typically used as a water supply source.

While all of the project alternatives would involve construction activities along the edge of San Francisco Bay, none would dredge or fill the Bay, affect any wetland, or affect other waters of the US, and none would therefore require a Section 404 permit from the US Army Corps of Engineers.

Covering pervious surfaces, such as lawns, other landscaped areas, and exposed soil, with pavement or other impervious cover reduces the infiltration of water to the subsurface and increases surface runoff. Under existing conditions and prior to the 1989 Loma Prieta Earthquake, paved surfaces cover more than 90 percent of the study area.

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[45] In 1991, the RWQCB adopted an extensive set of amendments to the Basin Plan, however, the 1991 amendments were invalidated in the fall of 1994 as a result of successful legal challenges to the procedures used by the SWRCB and RWQCB to amend water quality plans.

While none of the build alternatives would substantially increase the area of the impervious surfaces, each alternative would include construction of collection and conveyance structures which would deliver runoff generated by the roadway and ramps to the existing combined sewer system. (Under existing and pre-Loma Prieta conditions, the runoff from the eastern portions of the Embarcadero flow to the Bay rather than into the sewer system.) Under all the build alternatives, the volume of runoff collected by the sewer system at the project site would increase by a similar amount due to the expansion of the collection area east of The Embarcadero. The runoff volume from the area which includes the TSS ramp replacements would not increase as a result of the proposed project.[46]

The Southeast Water Pollution Control Plant has a design capacity for influent flow of 85 million gallons per day and a maximum capacity of 210 million gallons per day. The additional influent generated by any of the build alternatives would not substantially increase the load on the plant (less than four-tenths of one percent of the design capacity).

Under pre-earthquake, existing, and future 2015 conditions, the combined sewer system's capacity has the potential to be exceeded by storms more intense, and less frequent, than the five-year storm for which the system is designed. When the capacity of the combined wastewater conveyance system is exceeded, the runoff from the project site combine with runoff from upgradient areas of the study area and flows as overland flow and through existing overflow outfalls to the Bay. Relative to existing conditions, the minor increase in runoff resulting from construction of additional impervious surfaces under the build alternatives would not substantially increase the potential for wet-weather overflow events.

Potential Flooding Caused by Modification of Overland Flow

During large rainstorms, when the capacity of the combined sewer system is exceeded, the majority of storm water runoff within the study area flows as overland flow toward the Bay. Impedance of surface flow could result in flooding of low-lying areas and accompanying property damage. Preliminary plans and profiles indicate that surface roadway elevations within bayside portions of The Embarcadero of each of the build alternatives would be greater than existing conditions (-0.6meters/-2 feet SFD). Relative to existing and pre-Loma Prieta conditions, the project alternatives, as designed, would therefore reduce potential flooding hazards related to overtopping of the sea walls. Although the design of the storm water collection and conveyance system have not been completed, such a system would collect all runoff from the project area and direct flows to the existing combined sewer system components, under all build alternatives.

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[46] For more details regarding potential water-quality impacts of the proposed project, please see the Hydrology and Water Quality Background Report. A copy of this report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

The design of all surface roadway components of the proposed project would specifically provide for conveyance of overland flow. The position and height of curbs would prevent the obstruction of overland flow and reduce the depth of flow across the Embarcadero roadway. Overland flow in the areas of the proposed ramp modifications and replacements in Alternatives Three, Four and Five, would, in general, be located at higher elevations than those along The Embarcadero and are not as susceptible to flooding. The design of the ramps would, however, prevent ponding or localized flooding potentially caused by modification of overland flow.

Potential Increase in Urban Runoff Pollutant Load

The operation of roadways results in the discharge of contaminants to the environment that can be transported by runoff away from the roadways and new and/or modified ramps. The primary pollutants associated with roadways include heavy metals and petroleum hydrocarbons contained in fuels and lubricants which can leak or spill from vehicles and the products of incomplete combustion of fuel, including polynuclear aromatic hydrocarbons.

All build alternatives would include the construction of drainage conveyance systems collecting runoff from the eastern and western portions of the Embarcadero and directing the runoff into the City's combined sewer system. Under existing and pre-Loma Prieta conditions, some of the runoff potentially containing contaminants, from eastern portions of the roadway, are discharged directly into the Bay. The discharge of urban runoff during storm events exceeding the five-year storm and the potential for spills of contaminants resulting from roadway accidents or illegal disposal entering storm water inlets would not increase or decrease as a result of the project.

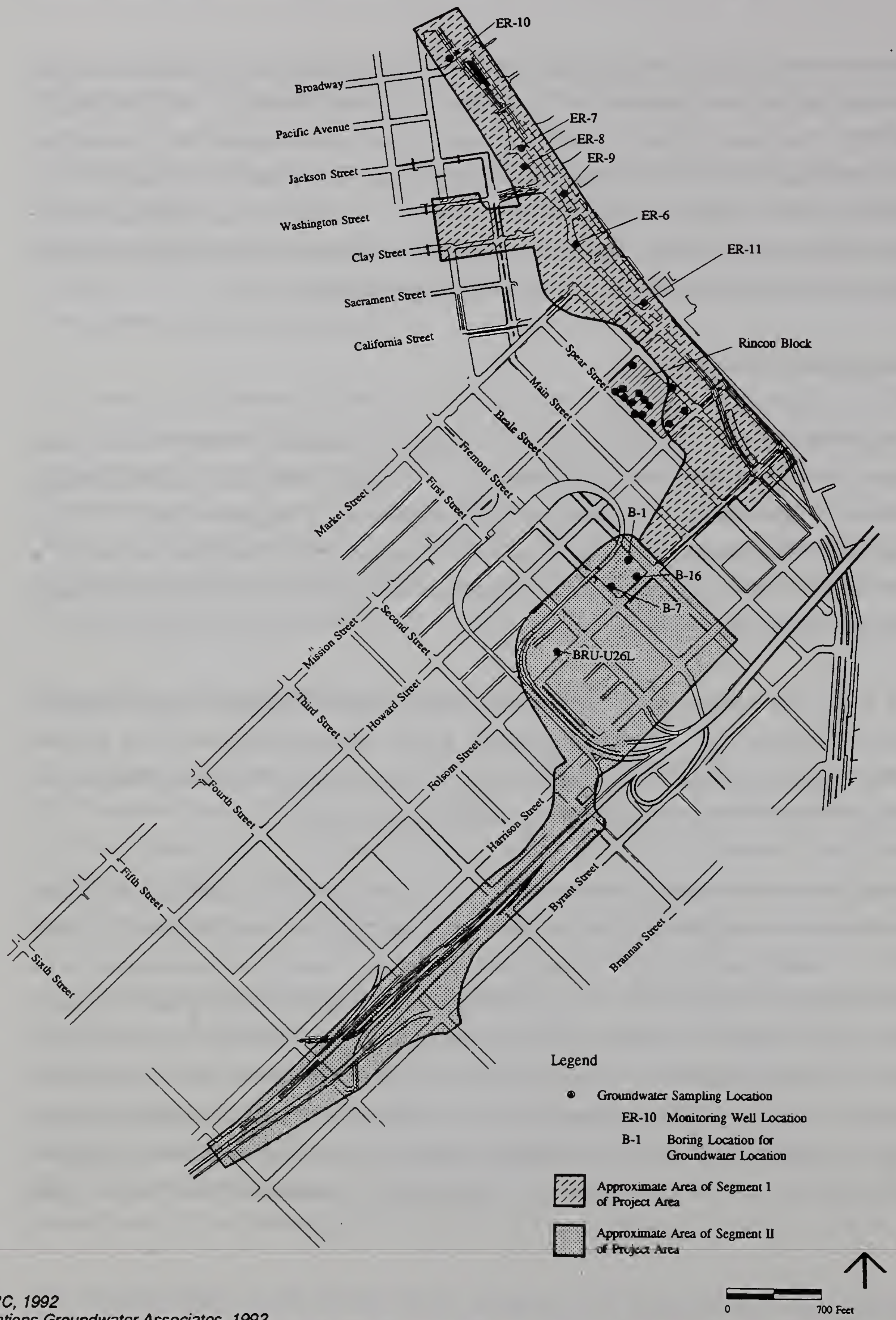
The Regional Water Quality Control Board recognizes that implementation of practices for reducing the impact of contaminants carried by runoff from roadways is an essential component of urban runoff management programs. Comprehensive municipal storm water control plans are required by recent provisions of the National Pollution Discharge Elimination System (NPDES). The City and County of San Francisco's combined sewer system, which collects and treats storm water, is operated in accordance with existing NPDES permits. This system is not subject to the recent storm water NPDES requirements. The collection and treatment of storm water by the combined sewer system is considered an appropriate and effective method of reducing the potential impacts of roadway runoff on receiving waters.

Construction Dewatering

Construction activities in all build alternatives, including excavation of utility trenches, could require excavation below the groundwater level. Typical construction practices require pumping of groundwater to dewater excavations below the groundwater level. It is not anticipated that extensive dewatering would be required for construction of ramps or improvements to the I-80 corridor, since these improvements would be supported by existing footings or driven piles.

Well and boring locations used as sampling points for determining groundwater quality are shown on Figure 4.12-1. The sampling points are not uniformly distributed or of sufficient number to provide comprehensive characterization of the study area, but provide data suitable for an assessment of groundwater quality conditions (Table 4.12-1).

Existing groundwater quality data indicate that the groundwater in some areas contains contaminants at levels that could require permits for discharging the water to sewers or surface waters or require treatment prior to discharge. Exposure of workers to contaminants in the groundwater or soil at the site during dewatering activities could present health or safety hazards which should be minimized. Management of contaminated soil and groundwater has been an integral component of the construction phase activities for the South Embarcadero Roadway Replacement Project; excavated soils are disposed off-site at an approved disposal facility, and groundwater has been managed by storing and/or pretreating in tanks on-site prior to discharge to the sewer system. The management of excavated soils for the south



Source: TRC, 1992
Nations Groundwater Associates, 1992

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Groundwater Quality Sample Locations	Figure 4.12-1

Table 4.12-1

SUMMARY OF EXISTING GROUNDWATER QUALITY DATA

Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure Project, San Francisco

(mg/L unless otherwise noted)

Analysis/Parameter	EPA Test Method	Detection Limits	Identification/Date Collected											Regulatory Levels	
			ER-6[1,2] 8/17/90	ER-7[1,2] 8/12/90	ER-8[1,2] 8/12/90	ER-9[1,2] 8/15/90	ER-10[2,3] 8/21/90	ER-11[1,2] 8/11/90	Rincon Point Block[3,4]	B-1[1,5] 6/1/92	B-7[1,5] 6/2/92	B-16[1,5] 6/3/92	BRU-U26L[1,6] 10/12/92	CCSF WWD[7]	RWQCB SWEL[8]
Metals															
Arsenic	7060/7061	0.005-0.05	0.1	ND	NA	0.4	0.006	0.03	0.007-0.3	0.160	1.00	0.090	ND	4.0	0.036
Barium	6010	0.002-0.05	0.429	10.1	36.2	13.3	0.227	0.85	0.08-2.7	0.096	1.10	0.80	0.2	--	--
Beryllium	6010	0.002-0.01	ND	ND	0.04	0.018	ND	ND	ND	ND	0.010	ND	ND	--	--
Cadmium	6010	0.001-0.01	0.015	0.089	0.151	0.041	ND	0.016	ND	ND	ND	ND	ND	0.5	0.0093
Cobalt	6010	0.004-0.05	0.046	0.488	0.804	0.292	ND	0.075	ND-0.18	ND	0.086	0.082	ND	--	--
Copper	6010	0.002-0.05	0.036	1.4	5.73	3.04	0.013	0.705	ND-2.4	0.054	0.210	1.200	ND	4.0	0.0029
Chromium	6010	0.004-0.05	0.15	0.969	3.61	0.987	ND	0.384	ND-0.74	0.061	0.604	0.540	ND	5.0	0.050
Lead	6010	0.01-0.05	0.08	2.6	16.7	13.3	ND	1.15	ND-5.0	ND	2.80	4.50	ND	1.5	0.0056
Mercury	7470/7471	0.0001-0.03	0.0002	0.027	NA	0.1	0.0004	0.01	ND-0.035	ND	ND	ND	ND	0.05	0.0021
Molybdenum	6010	0.004-0.077	ND	ND	ND	ND	ND	0.047	ND-0.29	ND	ND	ND	ND	--	--
Nickel	6010	0.01-0.05	0.17	0.824	3.01	0.886	ND	0.21	ND-0.91	0.0039	0.410	0.370	ND	2.0	0.0083
Selenium	7740/7741	0.005-0.05	0.05	ND	NA	0.93	0.11	0.07	ND	ND	ND	ND	ND	--	0.005
Silver	6010	0.002-0.05	ND	0.212	0.019	0.033	ND	ND	ND-0.05	ND	ND	ND	ND	0.6	0.0023
Thallium	6010/7840	0.04-1.0	ND	ND	ND	ND	ND	0.31	ND	ND	0.520	0.790	ND	--	--
Vanadium	6010	0.004-0.05	0.097	0.972	3.08	1.27	ND	0.332	ND-0.43	0.036	0.570	0.440	ND	--	--
Zinc	6010	0.002-0.05	0.106	3.21	14.8	6.02	0.034	1.66	0.22-5	0.120	0.480	2.109	0.9	7.0	0.086
Organic lead	LUFT	0.002	ND	ND	NA	ND	ND	ND	NA	NA	NA	NA	NA	--	--
Volatile organics	8240	0.005-0.1	ND	ND	ND	ND	ND	ND	ND	ND[9]	ND	ND	NA	--	--
Semi-volatile organics	8270														0.015[10]
Acenaphthene		0.004-0.01	ND	ND	NA	ND	ND	ND	ND-0.023	ND	ND	ND	NA	--	--
Anthracene		0.004-0.01	ND	ND	NA	ND	ND	0.004	ND-0.010	ND	ND	ND	NA	--	--
Benzo(a)anthracene		0.004-0.01	ND	ND	NA	ND	ND	0.016	ND-0.018	ND	ND	ND	NA	--	--
Benzo(b)fluoranthene		0.004-0.01	ND	ND	NA	ND	ND	0.032	ND-0.018	ND	ND	ND	NA	--	--
Benzo(k)fluoranthene		0.004-0.01	ND	ND	NA	ND	ND	ND	ND-0.018	ND	ND	ND	NA	--	--
Benzo(a)pyrene		0.004-0.01	ND	ND	NA	ND	ND	0.028	ND-0.024	ND	ND	ND	NA	--	--
Benzo(g,h,i)perylene		0.004-0.01	ND	ND	NA	ND	ND	0.018	ND-0.013	ND	ND	ND	NA	--	--
Bis(2-ethylhexyl)phthalate		0.004-0.01	0.005	ND	NA	ND	ND	ND	ND	ND	ND	ND	NA	--	--
Chrysene	8270	0.004-0.01	ND	ND	NA	ND	ND	0.018	ND-0.019	ND	ND	ND	NA	--	--

Table 4.12-1 (Continued)

SUMMARY OF EXISTING GROUNDWATER QUALITY DATA

Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure Project, San Francisco
(mg/L unless otherwise noted)

Analysis/Parameter	EPA Test Method	Detection Limits	Identification/Date Collected											Regulatory Levels	
			ER-6^{1,2} 8/17/90	ER-7^{1,2} 8/12/90	ER-8^{1,2} 8/12/90	ER-9^{1,2} 8/15/90	ER-10^{2,3} 8/21/90	ER-11^{1,2} 8/11/90	Rincon Point Block^{3,4}	B-1^{1,5} 6/1/92	B-7^{1,5} 6/2/92	B-16^{1,5} 6/3/92	BRU-U26L^{1,6} 10/12/92	CCSF WWD^{7}	RWQCB SWEL^{8}
Fluoranthene		0.004-0.01	ND	ND	NA	ND	ND	0.02	ND-0.028	ND	ND	ND	NA	--	--
Fluorene		0.004-0.01	ND	ND	NA	ND	ND	ND	ND-0.017	ND	ND	ND	NA	--	--
Indeno(123-cd)pyrene		0.004-0.01	ND	ND	NA	ND	ND	0.015	ND-0.013	ND	ND	ND	NA	--	--
2-methylnapthalene		0.004-0.01	ND	ND	NA	ND	ND	ND	ND-0.021	ND	ND	ND	NA	--	--
Naphthalene		0.004-0.01	ND	ND	NA	ND	ND	0.006	ND-0.043	ND	ND	ND	NA	--	--
Phenanthrene		0.004-0.01	ND	ND	NA	ND	ND	0.011	ND-0.028	ND	ND	ND	NA	--	--
Pyrene		0.004-0.01	ND	ND	NA	ND	ND	0.023	ND-0.026	ND	ND	ND	NA	--	--
Total recoverable petroleum hydrocarbons	418.1	0.6-0.7	ND	ND	NA	ND	ND	ND	NA	NA	NA	NA	NA	100^{11}	--
TPH as gasoline	5030/8015	0.05	ND	ND	NA	ND	ND	NA	ND-0.1	NA	NA	NA	NA	--	--
TPH as diesel	3550/8015	0.2	NA	NA	NA	NA	NA	NA	ND-1.4	NA	NA	NA	NA	--	--
PCBs	8080	0.05	NA	NA	NA	NA	NA	NA	ND					--	
pH			6.8	7.3	7.4	7.3	7.1	7.3	6.63-7.46	NA	NA	NA	NA	6.0-9.5	
Eh			-61	-24	-114	64	-83	-17	NA	NA	NA	NA	NA	--	
Electrical conductivity (µmhos)			NA	NA	NA	NA	NA	NA	26,500-34,000	NA	NA	NA	NA		
Temperature (C°)			NA	NA	NA	NA	NA	NA	16.8-21.2	NA	NA	NA	NA	52	

Notes:
Sample locations are shown on Figure 4.12-1
x.x = Bolded values exceed Wastewater Discharge Requirement concentrations.
ND = Constituent not identified above laboratory detection limits.
NA = Constituent not analyzed.
LUFT = Leaking Underground Fuel Tank manual.
TPH = Total Petroleum Hydrocarbons.
Eh = Redox potential.
PCB = Polychlorinated biphenyls.

[1] Water samples collected using in-situ water sampler from open boreholes.

[2] Samples collected by Dames & Moore (Dames and Moore, 1989).

[3] Values presented for Rincon Point Block represent the range concentrations found in water samples collected 5/8-10/90 from groundwater monitoring wells screened in uppermost water-bearing zone.

[4] Samples collected by Geo/Resources Consultants, Inc. (Geo/Resource Consultants, 1991).

[5] Samples collected by Nation's Groundwater Resources (Nations Groundwater Associates, 1992).

[6] Samples collected by TRC (TRC, 1992).

[7] City and County of San Francisco, Wastewater Discharge Requirement limits.

[8] RWQCB Shallow Water Effluent Limitations for Marine Water Aquatic Life (daily average) (RWQCB, 1992).

[9] Sample contained vinyl acetate (0.012 mg/L).

[10] 24-hour objective for total polynuclear aromatic hydrocarbon compounds (ΣPAHs). The 30-day SWEL for ΣPAHs is 0.00003 mg/L.

[11] The required CCSF standard for petroleum hydrocarbons is for hydrocarbons as oil and grease.

Embarcadero is discussed in the Hazardous Materials Effects Report prepared for that project.[47]

Pumping, storage, and disposal of potentially contaminated groundwater during dewatering activities for any of the build alternatives could expose site workers and the public to health risks. To mitigate any potential health risks associated with dewatering, the project contractor would be required to implement a health and safety plan. (See mitigation section, p. 426.)

Dewatering operations conducted during the proposed project construction could result in preferential groundwater flow toward the project site. The direction and rate of groundwater flow in areas outside the project site could be modified, potentially resulting in the migration of contaminants toward the site.

Each of the build alternatives would likely include temporary discharge of dewatering effluent to the combined sanitary/storm sewer system. If unregulated, concurrent discharges at other sites or facilities within the study area during the construction period, could result in a cumulative increase in wastewater flow and pollutant loading to the combined sewer system which exceeds the capacity or capability of treatment facilities.

The granting of dewatering permits would specify rates of groundwater extraction so that wastewater treatment facilities would not be overloaded.

Prior to discharge of the dewatering effluent to the combined sewer system, an approved Batch Industrial Wastewater Discharge permit would be required by the Department of Public Works, Bureau of Environmental Regulation and Management (BERM). The permit would include estimates regarding discharge rates, as well as water quality characteristics of the effluent. Representatives from BERM and/or the Southeast Water Pollution Control Plant would determine, prior to permit approval, whether the plant can accommodate the additional load. The DPW Bureau of Environmental Regulation and Management would also evaluate the potential cumulative loading effects prior to the issuance of batch discharge requirements for individual projects.

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[47] South Embarcadero Replacement Project, Hazardous Materials Report

[48] South Embarcadero Replacement Project, Hazardous Materials Report

Based on groundwater quality encountered during dewatering activities at the South Embarcadero roadway replacement project and preliminary groundwater quality data at the project site, it is likely that the water pollution control plant will be able to accommodate the temporary additional load. Representatives from the Department of Public Works and/or the Southeast Water Pollution Control Plant would determine whether the discharges were acceptable and, if not, evaluate on-site treatment options to reduce contaminants to acceptable levels. If the dewatering effluent does not meet the requirements for sewer discharge, provisions for other off-site treatment/disposal or on-site treatment would be made. These permit requirements, if appropriately enforced, would reduce the potential impact of disposal of contaminated groundwater into the combined sewer system to a less-than-significant level.

Minimizing the exposure of site workers and the public to the dewatering effluent requires a carefully designed wastewater management program. Prior to initiation of dewatering, groundwater samples would be collected from well points installed as part of the dewatering system. The samples would be analyzed for chemical constituents as specified by the Department of Public Works requirements for batch wastewater discharge. This would provide groundwater quality data specific to locations, so that disposal options could be considered prior to generation of large volumes of water. (See mitigation section, p. 437.)

Degradation of Runoff Quality During Construction

The build alternatives would involve roadway construction, including excavation, grading, stockpiling of soil, removal and replacement, and reconstruction of existing facilities. These activities would result in exposure of soil to erosion by runoff. It is possible for runoff generated at the study area during rainstorms to result in erosion of exposed soil. Sediment transported by the runoff could cause sedimentation in gutters or the sewer system. The accumulation of sediment could result in blockage of flows, potentially resulting in localized ponding or flooding.

Under existing conditions and under the No Build Alternative (Alternative One), the majority of runoff generated from the eastern half of the existing roadway and areas between the Embarcadero roadway and Bay flows directly to the Bay through storm water sewers or as overland flow, particularly during large storms. During construction, sediment could be transported by the runoff and discharged into the Bay, resulting in water quality degradation.

All construction activities resulting in the disturbance of soil at a site are required to comply with the terms of the Waste Discharge Requirements for Discharges of Storm Water Associated with Construction Activity. The terms for coverage under the general permit require that a Storm Water Pollution Prevention Plan (SWPPP) be developed and implemented at the project site during construction to reduce the potential for adverse effects of erosion and sedimentation. Typical contract specifications for City-sponsored projects require the construction contractor provide site drainage controls to prevent sewer system backup, discharge to Bay, or flow damage to property. The contractor would be responsible for permitting requirements, including the development and implementation of the SWPPP. The SWPPP is required to identify any potential pollutant sources that may affect the quality of the runoff and identify, construct, and implement storm water pollution prevention measures to reduce pollutants in storm water discharges from a construction site. Control measures could include the construction of detention structures, installation of siltation fencing, and appropriate grading practices. No additional mitigation for control of construction period runoff would be necessary; the implementation of the SWPPP would reduce this effect to a level of insignificance.

Mitigation Measures

- To minimize the exposure of site workers and the public to dewatering effluent, a wastewater management program would be designed and implemented. Groundwater samples would be collected from well points installed as part of the dewatering system. The samples would be analyzed for chemical constituents as specified by the City's Department of Public Works' requirements for batch wastewater discharge. This would provide groundwater quality data specific to locations, so that disposal options could be considered and decided upon prior to generation of large volumes of water.

- To mitigate potential hazards associated with dewatering, a written, sit-specific HSP would be developed for the proposed project by qualified professionals consistent with the existing Site Mitigation Plan (SMP) for the Waterfront Transportation Projects. The SMP currently requires that an HSP provide measures to protect workers and the surrounding community from hazardous chemical constituents in the soil. The HSP developed for the current project would require the identification of safety and health risk analyses for each site task and operation (including dewatering activities), employee training assignments, implementation of a monitoring program, and medical surveillance. In addition, all wells, piping, and discharge points would be within fenced areas to reduce the likelihood of the public coming into contact with contaminated groundwater.

Implementation of an appropriate site safety and health plan and a wastewater management program (discussed above) would reduce the potential effects on the health and safety of construction workers to a less-than-significant level. special instructions to the contractor, requiring a health and safety plan and wastewater management plan, would be included in the project contract documents.

4.13 ENERGY

Vehicular Energy Consumption

The energy consumed by vehicles using the roadway is measured in the number of liters (gallons) of fuel consumed in the AM and PM peak hours. The total fuel consumed by cars, trucks and buses is currently approximately 14,625 liters in the AM peak hour and approximately 17,224 liters in the PM peak hour (3,864 and 4,551 gallons, respectively). The calculation of vehicular energy consumption is a direct output of the TRAF-NETSIM traffic simulation computer model, which takes into consideration characteristics of the vehicle fleet and traffic conditions, and assumes an undifferentiated energy content of various fossil fuels. The projected vehicular energy consumption of the proposed alternatives is presented in Table 4.13-1.

In the AM peak hour, vehicles using Alternatives Two and Four would consume slightly more energy (two percent or less) than the No Build Alternative, Alternatives Three and Five would consume slightly less energy (2 percent or less). In the PM peak hour, all the build alternatives would reduce vehicular energy consumption compared to the No Build. The Fourth Street Options for Alternatives Three and Five would reduce energy consumption by the most (3.4 percent) in the PM peak hour. The fuel economy of vehicles traveling in the study area is a measure of the efficiency of the alternatives in accommodating projected traffic. All the build alternatives would increase the fuel economy observed in the study area. The greatest increase in fuel efficiency would be possible under Alternative Two in the AM peak hour and under Alternative Four in the PM peak hour.

TABLE 4.13-1
FUEL CONSUMPTION & FUEL EFFICIENCY

	FUEL CONSUMPTION											FUEL EFFICIENCY			
	Cars & Trucks				Buses				Total Operational Energy Consumption		Percent of No Build	Cars & Trucks		Buses	
	liters	*(gal.)*	Joules	*(BTU)*	liters	*(gal.)*	Joules	*(BTU)*	Joules	*(BTU)*		km/liter	*(mi/gal)*	km/liter	*(mi/gal)*
AM Peak Hour															
Year 1993	13302	*3514*	4.63E+11	*4.39E+08*	1324	*350*	4.61E+10	*4.37E+07*	5.10E+11	*4.83E+08*	N/A	4.00	*9.40*	1.48	*3.49*
Pre-earthqu	13656	*3608*	4.76E+11	*4.51E+08*	1333	*352*	4.64E+10	*4.40E+07*	5.22E+11	*4.95E+08*	N/A	3.78	*8.90*	1.46	*3.44*
Year 2015 -	16155	*4268*	5.63E+11	*5.34E+08*	1255	*332*	4.37E+10	*4.15E+07*	6.07E+11	*5.75E+08*	100.0%	3.77	*8.87*	1.47	*3.45*
Year 2015 -	16236	*4290*	5.66E+11	*5.36E+08*	1259	*333*	4.39E+10	*4.16E+07*	6.10E+11	*5.78E+08*	100.5%	3.82	*8.99*	1.46	*3.44*
Year 2015 -	16042	*4238*	5.59E+11	*5.30E+08*	1251	*330*	4.36E+10	*4.13E+07*	6.03E+11	*5.71E+08*	99.3%	3.74	*8.80*	1.46	*3.44*
Year 2015 -	15808	*4176*	5.51E+11	*5.22E+08*	1246	*329*	4.34E+10	*4.12E+07*	5.94E+11	*5.63E+08*	98.0%	3.76	*8.85*	1.46	*3.44*
Year 2015 -	16466	*4350*	5.74E+11	*5.44E+08*	1257	*332*	4.38E+10	*4.15E+07*	6.18E+11	*5.85E+08*	101.8%	3.78	*8.88*	1.47	*3.45*
Year 2015 -	16042	*4238*	5.59E+11	*5.30E+08*	1251	*330*	4.36E+10	*4.13E+07*	6.03E+11	*5.71E+08*	99.3%	3.74	*8.80*	1.46	*3.44*
Year 2015 -	15808	*4176*	5.51E+11	*5.22E+08*	1246	*329*	4.34E+10	*4.12E+07*	5.94E+11	*5.63E+08*	98.0%	3.76	*8.85*	1.46	*3.44*
PM Peak Hour															
Year 1993	16136	*4263*	5.62E+11	*5.33E+08*	1089	*288*	3.79E+10	*3.60E+07*	6.00E+11	*5.69E+08*	N/A	3.89	*9.16*	1.46	*3.43*
Pre-earthqu	17174	*4537*	5.98E+11	*5.67E+08*	1094	*289*	3.81E+10	*3.61E+07*	6.37E+11	*6.03E+08*	N/A	3.39	*7.98*	1.41	*3.31*
Year 2015 -	18440	*4872*	6.43E+11	*6.09E+08*	1003	*265*	3.49E+10	*3.31E+07*	6.77E+11	*6.42E+08*	100.0%	3.68	*8.66*	1.48	*3.47*
Year 2015 -	17856	*4718*	6.22E+11	*5.90E+08*	986	*260*	3.43E+10	*3.26E+07*	6.57E+11	*6.22E+08*	96.9%	3.82	*8.99*	1.48	*3.47*
Year 2015 -	17855	*4717*	6.22E+11	*5.90E+08*	992	*262*	3.46E+10	*3.28E+07*	6.57E+11	*6.22E+08*	96.9%	3.82	*8.98*	1.48	*3.47*
Year 2015 -	17792	*4701*	6.20E+11	*5.88E+08*	986	*260*	3.43E+10	*3.26E+07*	6.54E+11	*6.20E+08*	96.6%	3.82	*8.98*	1.48	*3.47*
Year 2015 -	17943	*4741*	6.25E+11	*5.93E+08*	981	*259*	3.42E+10	*3.24E+07*	6.59E+11	*6.25E+08*	97.3%	3.84	*9.04*	1.49	*3.51*
Year 2015 -	17855	*4717*	6.22E+11	*5.90E+08*	992	*262*	3.46E+10	*3.28E+07*	6.57E+11	*6.22E+08*	96.9%	3.82	*8.98*	1.48	*3.47*
Year 2015 -	17792	*4701*	6.20E+11	*5.88E+08*	986	*260*	3.43E+10	*3.26E+07*	6.54E+11	*6.20E+08*	96.6%	3.82	*8.98*	1.48	*3.47*

1 BTU = 1055.06 Joules

Street Lighting

Street lighting is the primary consumer of electrical energy during operation of the existing Embarcadero roadway. Electricity consumption along The Embarcadero and side streets in the Embarcadero corridor would remain constant between today and the year 2015, and each roadway alternative, including the No Build, would consume an estimated 227,800 kWH annually. The amount of electrical energy consumed by lighting the freeway ramps would vary between the alternatives. The No Build Alternative (Alternative One) and Alternatives Two and Four would require the least since no new ramps are proposed compared to existing conditions.

The Second Street Option of Alternatives Three and Five would make the most extensive improvements to the freeway ramp system and would consequently require slightly more lighting (approximately 1100 more kWH per year). Table 4.13-2 summarizes the electrical energy consumed by street lighting for each alternative in kilowatt hours (kWH).

TABLE 4.13-2
STREET LIGHTING ENERGY CONSUMPTION

Alternative	**Roadway**	**Freeway Ramps**	**Annual Total**
1	227,800	N/A	227,800
2	227,800	N/A	227,800
3a	227,800	14,235	242,035
3b	227,800	13,140	240,940
4	227,800	N/A	227,800
5a	227,800	14,235	242,035
5b	227,800	13,140	240,940

Source: Parsons Brinckerhoff Quade & Douglas

Construction Energy

The amount of energy required to build a transportation facility is dependent on the nature of the proposed physical improvements of each alternative. The amount of materials consumed, the construction techniques employed, the overall length of the facility, the amount of elevated or underground structures and the types of construction equipment needed, all influence the amount of energy required during construction. Because final, detailed construction plans are not available, overall cost is used as a surrogate for detailed information on construction techniques and materials.

Alternatives Three and Five propose the most extensive improvement to the freeway ramp system, requiring elevated structures and consequently, would have the highest construction energy consumption. Alternatives Two and Four would have less extensive ramp improvements and would thus use about half the construction energy of Alternatives Three and Five. Table 4.13-3 presents the energy required (in joules [BTUs]) to build each alternative and its equivalent energy expressed in volume of gasoline.

TABLE 4.13-3
ENERGY USED IN CONSTRUCTION

Alternative	Cost	Liters	*(Gallons)*	Joules	*(BTUs)*
1	$18,400	1 018	(269)	3.55×10^{10}	3.36×10^{7}
2	$62,000,000	3 429 840	(906,310)	1.20×10^{14}	1.14×10^{11}
3a	$102,000,000	5 642 640	(1,491,039)	1.97×10^{14}	1.86×10^{11}
3b	$101,000,000	5 587 320	(1,476,410)	1.95×10^{14}	1.85×10^{11}
4	$68,000,000	3 761 760	(994,020)	1.31×10^{14}	1.24×10^{11}
5a	$103,000,000	5 697 960	(1,505,650)	1.99×10^{14}	1.88×10^{11}
5b	$102,000,000	5 642 640	(1,491,030)	1.97×10^{14}	1.86×10^{11}

Source: Parsons Brinckerhoff Quade & Douglas

The electrical energy required for construction are normally incidental, used primarily for the operation of hand tools and on-site office equipment and temporary night lighting. The latter varying at different stages of construction. For the purpose of comparison, it has been assumed that an average 3 kWH will be required in the daytime and an average of 10 kWH at night. For 22 working days per month, the electrical energy usage during construction is estimated at 4500 kWH per month. Based on preliminary construction staging plan, Alternative Two would take 20 months to construct. Alternative Three would take 21 months, Alternative Four would take 20 months and Alternative Five would take 21 months.

4.14 HAZARDOUS MATERIALS

The management of hazardous materials in soils is subject to numerous laws and regulations, enacted and enforced at the Federal, State, and local levels. The laws and regulations have been established to provide specific requirements for proper handling, storing, transporting, and disposing of hazardous materials, including hazardous wastes[49]. The Federal, State, and local regulations and regulatory agencies most relevant to the proposed project include:

- Titles 40 and 29 of the Code of Federal Regulations (40 CFR and 29 CFR), enforced by the Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA);

- Title 26 of the California Code of Regulations (26 CCR), enforced by Cal/EPA Department of Toxic Substances Control (DTSC), Cal/OSHA, and the Regional Water Quality Control Board (RWQCB);

- Article 20 of the San Francisco Municipal Code, enforced by the San Francisco Department of Public Health (SFDPH).

The above regulations specify the handling of hazardous materials by workers trained in health and safety practices for hazardous materials management; storage of materials done in a manner which minimizes potential exposure to and releases of hazardous materials; that transportation be arranged under manifest by a licensed-hauler; and that materials be disposed of at an appropriate disposal facility permitted to accept hazardous waste.

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[49] State and Federal regulations generally define wastes as materials which have been discarded, such as by being disposed of , or accumulated or stored in lieu of being disposed of.

Among the provisions of Title 26 CCR potentially affecting hazardous materials management at the project is the provision that waste may be classified as non-hazardous by DTSC, if the waste (1) contains concentrations of contaminants which meet or exceed California hazardous waste criteria, (2) would not be considered a federally regulated waste, and (3) is determined to possess mitigating physical and chemical characteristics rendering the waste insignificant as a hazard to human health or the environment. If the waste meets the above conditions, an application may be submitted to DTSC Waste Evaluation Unit requesting approval to classify and manage the waste as non-hazardous.

Article 20 of the San Francisco Municipal Code is the local ordinance pertaining to hazardous materials and relevant to the project. Article 20 outlines requirements for environmental site assessment to be performed at sites in San Francisco located bayward of the 1851 or 1868 high-tide lines where construction of the site involves disturbance of 50 cubic yards of soils or more. The purpose of Article 20 is to provide for the characterization and mitigation of potential health or environmental hazards associated with the excavation/disturbance of subsurface fill materials containing hazardous materials. Previous studies of the quality of the artificial fill materials underlying the waterfront area have indicated the presence of hazardous materials throughout the fill area.

Based on information from previous subsurface investigations, the City and County of San Francisco submitted a waste classification application to DTSC, requesting non-hazardous classification for all soils to be excavated as part of roadway reconstruction along the waterfront. Using previously obtained chemical and physical data from this portion of The Embarcadero alignment, the Waste Classification Application for The Embarcadero Roadway Project was completed and submitted to DTSC for review and approval which granted approval for the non-hazardous classification in September 1993. Soils underlying areas west of The Embarcadero have not been reclassified and would require handling as hazardous waste until additional characterization, if conducted, determined these soils to be non-hazardous.

Soil Quality

The discussion of subsurface soil quality within the study area, presented below, is based on data contained in eleven reports, prepared between 1989 and 1993, documenting soil sampling and analyses performed for project sites within the study area, including the Embarcadero

Roadway project site, the Muni Metro Turnaround project site, the Rincon Point Block project site, and the Terminal Separation project site.[50]

Eight of the eleven reports document environmental site assessments conducted to characterized the extent of hazardous materials in subsurface soils in compliance with Article 20. One report was conducted for Caltrans for the Terminal Separation rebuild project within Article 20 jurisdiction but did not specifically address Article 20 requirements. One report documented an environmental site assessment outside Article 20 jurisdiction. One report represented a Waste Reclassification application requesting DTSC to grant a non-hazardous classification for subsurface soils requiring excavation and disposal as part of construction of the Muni-Metro Turnaround Facility Project; that non-hazardous classification was approved by DTSC in October 1992. The eight reports prepared for compliance with Article 20 were prepared by environmental professionals and, each contained a statement or certification by the report preparer that the activities documented in the report were conducted in compliance with Article 20. The Waste Reclassification report for the Muni-Metro Turnaround facility did not require inclusion of a certification of compliance with Article 20, since that report was not prepared pursuant to Article 20 requirements. The Waste Reclassification report for the soils underlying the Embarcadero Roadway was also not prepared for Article 20 compliance purposes.

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[50] BASELINE, 1993a, *Waste Classification Application, Embarcadero Roadway project, San Francisco,* prepared for the City and County of San Francisco Department of Public Works, April.

BASELINE, 1993b, *Phase II Site Assessment, Embarcadero Replacement Properties block 202, Lots 6, 14, and 15, and Block 203, Lot 14, San Francisco,* prepared for the City and County of San Francisco Department of Public Works, December.

Camp Dresser & McKee, Inc., 1993, *Draft Soil Sampling Report, North Embarcadero Roadway,* prepared for the City and County of San Francisco Department of Public Works, Bureau of Construction Management, 22 January.

Dames & Moore, 1990, *final Report and appendices, Preliminary Hazardous Waste Investigation, Embarcadero Roadway Project, San Francisco,* prepared for Bechtel Environmental, Inc., 7 November.

Hardin Lawson & Associates, 1992, *Waste Classification Application - Cut and Cover Portion, Muni Metro Turnaround Project, San Francisco, Volumes I, II, III, IV, and Appendices,* prepared for the City and County of San Francisco Public Utilities Commission, Utilities Engineering Bureau, 16 June.

Geo/Resource Consultants, Inc., 1991a, *Site Characterization Report for 200 Embarcadero Rincon Point Block, San Francisco,* prepared for the City and County of San Francisco, Department of Public Works, January.

Geo/Resource Consultants, Inc., 1991b, *Site Characterization Report for 240 Embarcadero Rincon Point Block, San Francisco,* prepared for the City and County of San Francisco Department of Public Works, January.

Geo/Resource Consultants, Inc., 1991c, *Site Characterization Report for 260 Embarcadero Rincon Point Block, San Francisco,* prepared for the City and County of San Francisco Department of Public Works, January.

Geo/Resource Consultants, Inc., 1991d, *Site Characterization Report Muni Metro Turnaround Project, San Francisco,* prepared for the City and County of San Francisco Public Utilities Commission, Utilities Engineering Bureau, April.

Nations Groundwater Associates, 1992, *Site Investigation Report, 480 Terminal Separation, San Francisco,* prepared for California Department of Transportation (Contract Number 53P614), July.

TRC Environmental Corporation, 1992, *Report on Soil and Groundwater Investigation, Route 480 Terminal Separation, Postmiles 0.0/0.7, San Francisco,* prepared for California Department of Transportation, Environmental Engineering Branch (Contract Number 53S515), December.

Analytical results of soil samples collected from 105 borings within the study area, as part of previous investigations, were reviewed and summarized as part of this analysis.[51] The locations of all soil borings are shown on Figures 4.14-1, 4.14-2 and 4.14-3. The soil samples were analyzed for a variety of chemical constituents and other physical parameters, including those required by Article 20. The results of sample analyses indicated the presence of a number of chemical constituents at concentrations ranging from just above laboratory detection limits to above regulatory thresholds for hazardous waste determination. Constituents detected in samples included metals, volatile and semi-volatile organic compounds, and total petroleum hydrocarbons, some of which are listed as proposition 65 carcinogens. For the purposes of this hazardous materials assessment, only those contaminants detected at concentration exceeding or potentially exceeding hazardous waste criteria are described below for each study area section. In addition, the discussion of soil quality for each section identifies whether waste soils generated during implementation of the project would be considered regulated hazardous waste based on analytical data. Table 3.10-1 in the Affected Environment section presents a summary of the previous investigations conducted and identified contaminants within the study area. Table 4.14-1 presents high and low values for each compound detected within each section. Data compiled in this report may not be statistically representative.

Section I

Soil samples collected from this section contained metals exceeding regulatory threshold levels and low levels of semi-volatile organic compounds (including PNAs). One sample contained lead at concentrations above the TTLC; another contained mercury at a concentrations equal to ten times the STLC. Based on available data, excavation activities within this section could encounter soils with hazardous levels of metals and potentially hazardous levels of semi-volatile organics.

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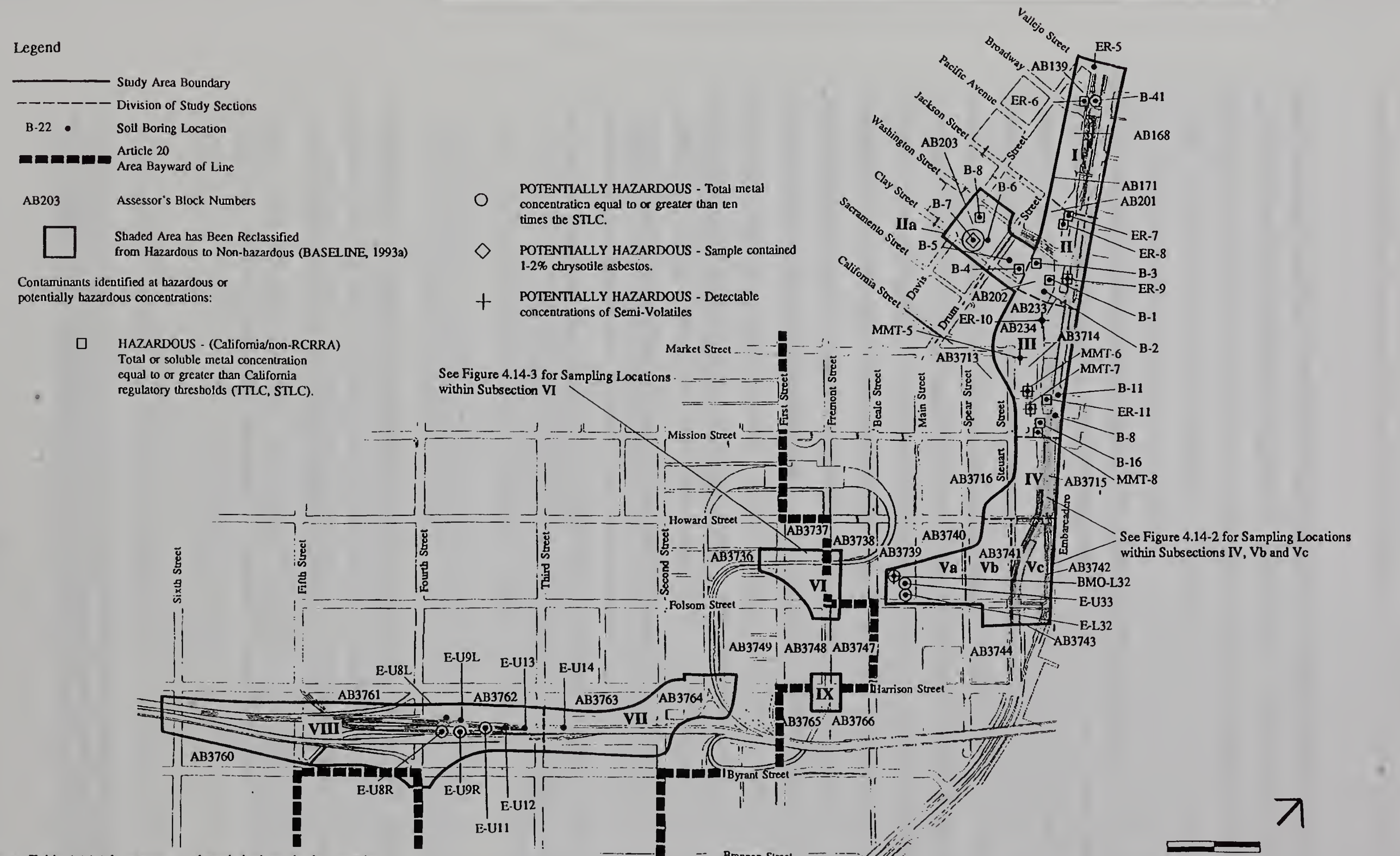
[51] For more details on soils conditiions in the proposed project area and the potential hazardoius materials effects of the proposed project, please see the Hazardous Materials Background Report. A copy of this report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.



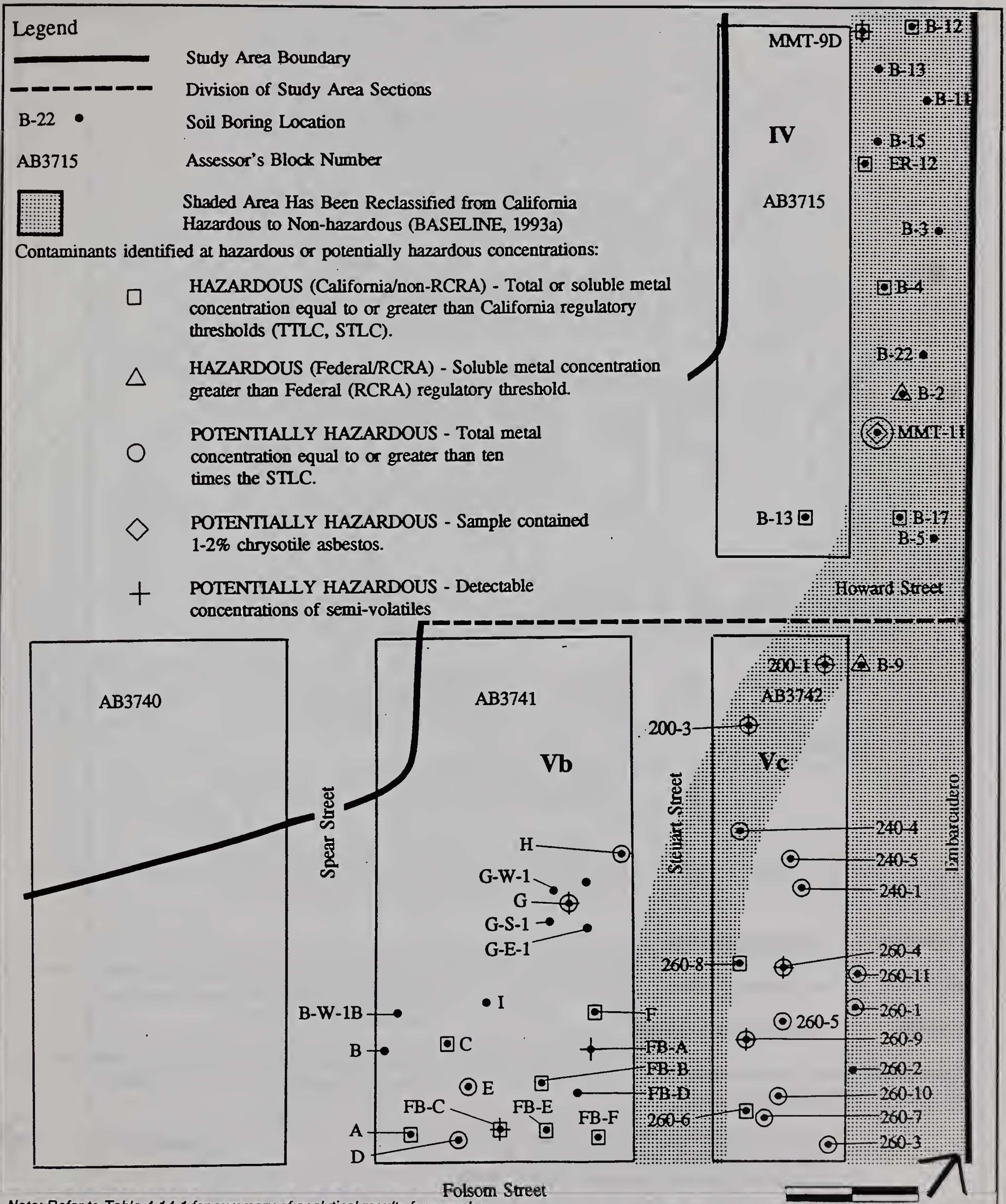
Note: Refer to Table 4.14-1 for summary of analytical results for samples.

Source: HLA, 1992; Geo/Resource, 1991; Dames and Moore, 1990; Camp Dresser McKee, 1993; BASELINE, 1993; TRC, 1992

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

Delineation of Study Area and Locations of Soil Borings Sections I, IIa, III, Va, VII, VIII

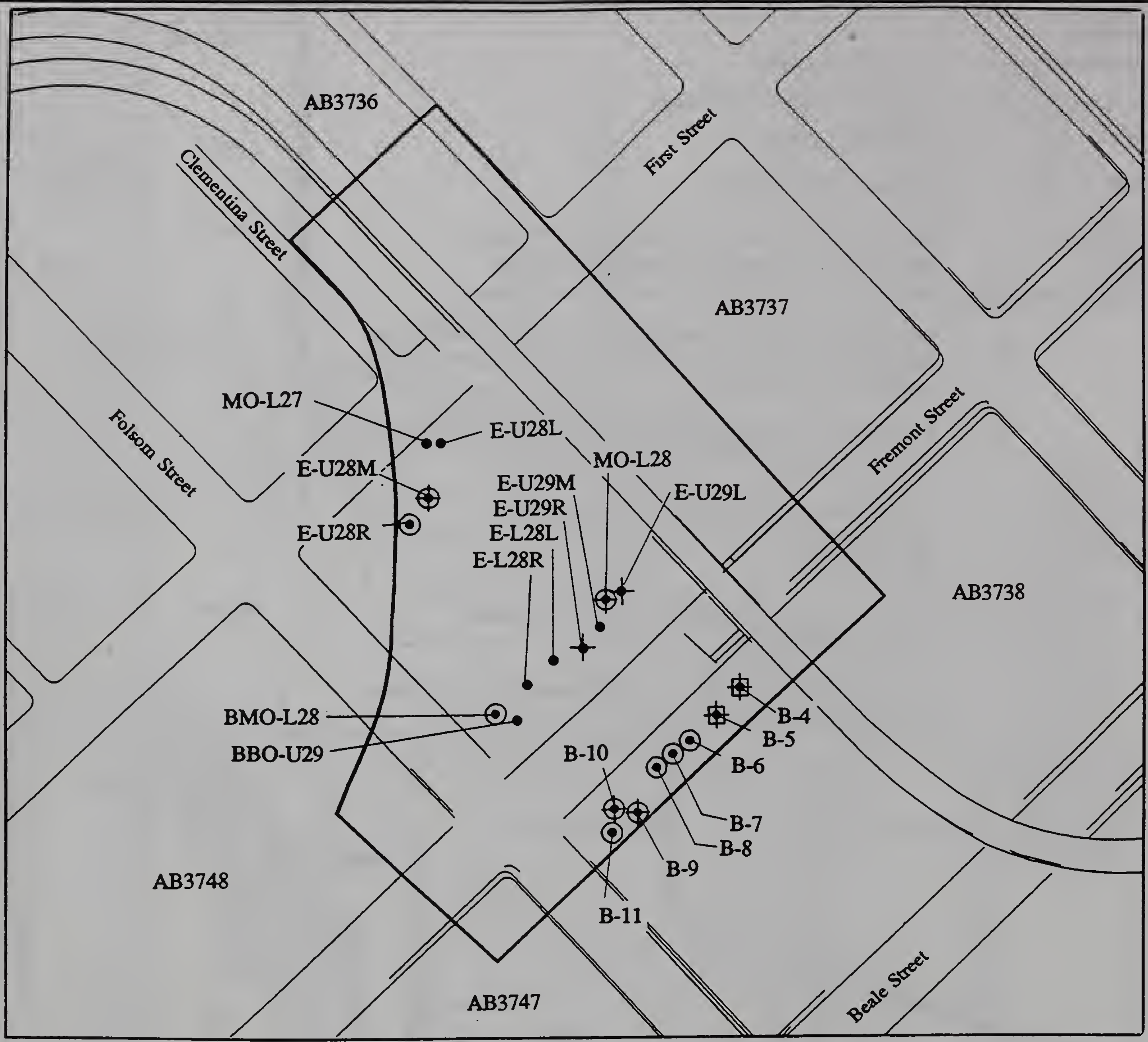
Figure 4.14-1


Legend
Study Area Boundary
Division of Study Area Sections
B-22 • Soil Boring Location
AB3715 Assessor's Block Number
Shaded Area Has Been Reclassified from California Hazardous to Non-hazardous (BASELINE, 1993a)
Contaminants identified at hazardous or potentially hazardous concentrations:
□ HAZARDOUS (California/non-RCRA) - Total or soluble metal concentration equal to or greater than California regulatory thresholds (TTLC, STLC).
△ HAZARDOUS (Federal/RCRA) - Soluble metal concentration greater than Federal (RCRA) regulatory threshold.
○ POTENTIALLY HAZARDOUS - Total metal concentration equal to or greater than ten times the STLC.
◇ POTENTIALLY HAZARDOUS - Sample contained 1-2% chrysotile asbestos.
+ POTENTIALLY HAZARDOUS - Detectable concentrations of semi-volatiles
MMT-9D
B-12
B-13
B-1
IV
B-15
ER-12
AB3715
B-3
B-4
B-22
B-2
MMT-11
B-13
B-17
B-5
Howard Street
AB3740
AB3741
Vb
200-1
B-9
AB3742
200-3
Vc
Spear Street
Steuart Street
Embarcadero
H
G-W-1
G
G-S-1
G-E-1
240-4
240-5
240-1
260-8
260-4
260-11
B-W-1B
I
F
260-1
260-5
260-9
B
C
FB-A
FB-B
260-2
E
FB-D
260-10
FB-C
FB-E
FB-F
260-6
260-7
A
D
260-3
Folsom Street
0
150 Feet

Note: Refer to Table 4.14-1 for summary of analytical results for samples.

Source: Baseline

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Soil Boring Locations Sections IV, Vb, Vc	Figure 4.14-2



Legend

Study Area Boundary

BBO-U29 ● Soil Boring Location

AB3748 Assessor's Block Number

Contaminants identified at hazardous or potentially hazardous concentrations:

☐ HAZARDOUS (California/non-RCRA) - Total or soluble metal concentration equal to or greater than California regulatory thresholds (TTLC, STLC).

○ POTENTIALLY HAZARDOUS (California/non-RCRA) - Total metal concentration equal to or greater than ten times the STLC.

+ POTENTIALLY HAZARDOUS (California/non-RCRA) - Detectable concentrations of Semi-Volatiles.

0 150 Feet

Note: Refer to Table 4.14-1 for summary of analytical results for samples.

Source: TRC, 1992; Nation, 1992

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Soil Boring Locations Section VI	Figure 4.14-3

TABLE 4.14-1
SUMMARY OF ANALYTICAL RESULTS, SOIL
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure Project, San Francisco

			SUBAREA SECTIONS									
	STLC	TTLC	I	II	IIa	III	IV	V			VI[1]	VII[1]	VIII[1]
								V-a	V-b	V-c			
Total Metals (mg/kg)													
Antimony	15.0	500	ND	<3-<10	<3.0	<9.8-<30.0	<30.0	<2.0	<3.0	<25	<2.0-<34.0	<2.0	<2.0
Arsenic	5.0	500	4.0-5.0	<3-6.5	<3.0	.58-5.0	<0.005-8.5	2.0	1.6-9.1	<0.5-8.3	<1.0-**150**	<1.0	<1.0-2.3
Barium	100	10,000	426-698	21.3-174	2.2-44.0	21.0-320	25.0-270	8.2-99.8	41.4-489	1.5-200	2.1-600	59.4-105	8.8-218
Beryllium	0.75	75.0	0.48-2.42	0.6-0.53	<0.1-0.1	<0.20-0.55	<0.5	<0.5	<0.05-0.6	<1.0	0.25-1.5	<0.5	<0.5
Cadmium	1.0	100	1.39-2.27	<0.3-1.81	<3.0	<0.5-6.2	0.55-1.2	<0.5	<1.0	<1.0	0.25-2.0	<0.5	<0.5
Total Chromium	560	2,500	19.5-20.9	14-37	35-770	14.0-38.0	8.93-86.0	19.0-39.8	14.2-331	<1.0	<0.5-56.0	10.0-46.0	13.3-40.8
Cobalt	80.0	8,000	4.2-16.6	3.6-21.8	5.1-48.0	<0.5-12.7	<0.5-9.99	3.1-7.6	10.0-112	<5.0-68.0	<0.5-12	5.2-7.2	2.7-5.3
Copper	25.0	2,500	27.1-177	3.06-214	14.0-15.0	3.9-**275**	3.0-**1,830**	3.1-212	1.2-**18,400**	5.0-**350**	<0.5-**820**	4.2-8.6	4.6-50.0
Mercury	0.2	20.0	0.1-**2.0**	<0.1-0.64	<0.1-0.1	<0.5-**3.5**	<0.001-240	<1.0	<0.1-6.8	0.07-230	<1.0	<1.0	<1.0
Lead	5.0	1,000	27.6-**2,180**	12.0-401	<3.0-77.0	<3.0-**250**	0.26-**740**	1.1-**175**	1.1-**2,674**	0.34-**4,300**	<1.0-**1,600**	<1.0-1.6	<1.0-**280**
Molybdenum	350	3,500	ND	<0.39-1.0	<0.7-1.2	<0.39-12.0	0.98-7.2	,2.0	<1.0	<5.0-190	<2.0	<2.0	<2.0
Nickel	20.0	2,000	16.8-36.5	14.7-57.0	26.0-**1,100**	12.0-31.0	11.0-75.0	15.7-39.6	22.3-**2,680**	6.5-62.0	<0.5-39.0	15.3-56.4	14.2-32.2
Selenium	1.0	100	ND-2.0	<1.0	<3.0	<1.0	0.02-0.4	<1.0	<0.3	<0.5	<1.0	<1.0	<1.0
Silver	<0.5	500	ND-1.2	<0.2-0.51	<0.5	<0.20-2.11	0.48-1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	7.0	200	ND	<3.0	<3.0	<3.9-<30.0	<30.0	<2.0	<0.4	<10.0	<2.0-65.0	<2.0	<2.0
Vanadium	24.0	2,400	23.8-38.5	18.0-26.0	19.0-23.0	<5.0-34.0	6.5-30.4	9.7-48.2	32.9-44.4	6.5-36.0	<0.5-52.0	8.5-18.3	11.7-17.9
Zinc	250	5,000	73.4-1,010	16.7-906	15.0-50.0	14.0-590	22.0-299	19.8-530	53.2-96.4	10.0-490	0.8-790	13.9-15.7	10.5-274
WET Metals (mg/L)													
Mercury	.02	--							<0.01-0.05				
Lead	5.0	--		**5.1-28.0**	<0.06-**9.6**	0.6-**8.6**	0.22-**39.0**		1.7-**76.6**	**12.0-110**	3.1-**67.6**		**10.4-16.0**
TCLP Metals (mg/L)													
Mercury	--	--					<0.001-0.8		<0.01				
Lead	--	--	0.14-1.5	<0.06	<0.06	0.1-0.27	0.1-**9.8**		<0.5-1.4	0.31-**7.60**	0.56-2.8		<0.8
Barium	--	--				0.1-0.80	0.16-2.9			0.46-1.70			
Cadmium	--	--					0.05-0.5			0.05-0.50			
Chromium	--	--					0.05-1.9						

CONTINUED...

TABLE 4.14-1 (continued)
SUMMARY OF ANALYTICAL RESULTS, SOIL
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure Project, San Francisco

			SUBAREA SECTIONS										
	STLC	TTLC	I	II	IIa	III	IV	V			VI[1]	VII[1]	VIII[1]
								V-a	V-b	V-c			
Petroleum Hydrocarbons													
Gasoline	--	--	<0.05	<0.05	<1.0	<1.0	<1.0	<2.0-2.9	ND	<1.0	<2.0		ND
Kerosene	--	--											
Diesel	--	--						<3.0	<10.0-280	<10.0-2,400	<3.0-9.4		ND
Motor Oil	--	--							<25.0-7,990				
TRH (mg/kg)	--	--	<20	<20-87		<20.0-23.0	20.0	141-488			3.0-8,000	13.6	5.5-8,725
Other Organics													
Volatile Organic Compounds (mg/kg)	--	--	ND	ND-120	ND-0.020	ND-0.16	ND-0.12	ND	ND-0.136	ND-11.0	ND-0.38	ND	ND
Semi-Volatile Compounds (mg/kg)	--	--	ND-0.72		<0.20-**0.80**	**0.2-32.0**	2.0-6.0	**0.375-0.825**	**0.478-54.0**	ND-36.0	**0.39-7.025**	ND	ND
MiscellaneousParameters													
Aquatic Bioassay (mg/l)	--	--				>750	>750						
pH	--	--	7.1-8.6	8.3-10.5	7.6-7.8	5.9-11.0	7.5-11.0		7.81-8.5	7.3-9.1			
Cyanide (mg/kg)	--	--				<0.5-<50.0	<50.0	0.39-46.0		<1.0			
Sulfide (mg/kg)	--	--	<25	<25-35		6.4-16.0	6.4-16.0		76.0-376.0	<1.0-890			
Asbestos (%)	--	--			<1-5.0		1.0-2.0		<1.0				

Notes:
STLC = Soluble Threshold Limit Concentration.
STLC = Soluble Threshold Limit Concentration.
No entry = compound not analyzed.
TRH = Total recoverable hydrocarbons.
BTXE = Benzene, toluene, xylenes, and ethylbenzene.
ND = Not detected (various detection limits for compounds within this group)
<x.x = Component not detected above indicated concentration.
-- = Not applicable.
Bolded values represent hazardous or potentially hazardous levels (exceed STLC, TTLC, or 10 times STLC).
Refer to Figure 4.14-1, 4.14-2 and 4.14-3 for sampling locations.

Data for this table was compiled from the following sources: Dames and Moore, 1990; BASELINE, 1993; Harding Lawson Associates, 1992; Geo/Resource consultants, 1991; Camp Dresser McKee, 1993; TRC Environmental corporation, 1992; Nations Groundwater Associates, 1992.

[1] Portions of the data compiled from summary tables (laboratory reports not included in documents reviewed).

Section II

Soil samples collected from this section contained metals exceeding regulatory thresholds, semi-volatile organic compounds (including (PNAs), and asbestos. Metals exceeding regulatory thresholds include copper, lead, and nickel. Based on available data, excavation activities within this section could encounter soils with hazardous levels of metals and potentially hazardous levels of semi-volatile organics and asbestos.

Section III

Soil samples collected from this section contained metals exceeding regulatory threshold levels and semi-volatile organic compounds (including PNAs). Soluble lead was identified at concentrations exceeding the STLC. Mercury and copper were detected at concentrations greater than ten times the STLC. Based on available data, excavation activities within this section could encounter soils with hazardous levels of metals and/or potentially hazardous levels of semi-volatile organic compounds.

Section IV

Soil samples collected from this section contained metals exceeding regulatory threshold levels and semi-volatile organic compounds (including PNAs). Soluble lead was identified at concentrations exceeding the STLC and Federal (RCRA) threshold levels. Total copper was detected at concentrations greater than ten times the STLC. Based on available data, excavation activities within this section could encounter soils with hazardous levels of metals and/or potentially hazardous levels of semi-volatile organic compounds.

Section V

Soil samples collected from this section contained metals exceeding regulatory threshold levels and semi-volatile organic compounds (including PNAs). Total lead, copper, and nickel were identified at concentrations exceeding the TTLC. Soluble lead was detected at concentrations greater than the STLC and Federal (RCRA) threshold levels. Based on available data, excavation activities within this section could encounter soils with hazardous levels of metals and/or potentially hazardous levels of semi-volatile organic compounds.

Section VI

Soil samples collected from this section contained metals exceeding regulatory threshold levels and semi-volatile organic compounds (including PNAs). Lead was identified at concentrations exceeding the TTLC. Arsenic and copper were detected at concentrations greater than ten times the STLC. Based on available data, excavation activities within this section could encounter soils with hazardous levels of metals and/or potentially hazardous levels of semi-volatile organic compounds.

Section VII

The two samples collected from the single boring completed in this section did not contain hazardous or potentially hazardous concentrations of any of the analyzed compounds. However, it is unlikely that two samples adequately represent the soil conditions of the entire section.

Section VIII

Soil samples collected from this section contained metals exceeding regulatory threshold levels Samples collected at three boring locations contained lead at concentrations above then times the STLC. Based on available data, excavation activities within this section could encounter soils with potentially hazardous levels of metals.

Section IX

No subsurface data was available for this section. However, historic land uses for this section, which include a lead smelting plant, are similar to other sections within the study area. It is likely that similar contaminants would be encountered during excavation activities within this section, as would be encountered elsewhere in the study area, including metals and semi-volatile organics.

Construction Effects

Exposure of construction workers and the general public to hazardous materials in soils, which would be excavated and managed at the project area prior to being disposed of, could result in adverse effects to human health and safety. Assuming that the soil, irrespective of location, could affect human health and safety, all build alternatives would result in potential effects to workers and/or the public. Based on the consistency of the range and levels of specific hazardous materials identified throughout the study area, the potential health and safety effects for each of the build alternatives would be similar. (See Table 3.10-1 on pp. 194-196 for a summary of known contaminants.) Any differences in effects occurring under each alternative would relate to exposure scenarios for each alternative, based on the volume of materials excavated and the length of time the exposure of potentially hazardous materials to humans and the environment would occur.

Volumes of materials to be excavated for each build alternative (excluding ramp construction and improvements along I-80) would be approximately equivalent and are estimated at 34,200 bank meters[52] (45,000 bank yards); expansion of soils during excavation could increase estimated soil volumes by 20 to 50 percent. Soil volumes expected to be generated during construction of ramps and improvements along the I-80 corridor would be minimal; probably less than 760 bank meters (1,000 bank yards). In total, each build alternative would require excavation and disposal of between 51,300 bank meters (67,200 bank yards) (Alternative Two) and 52,500 bank meters (68,700 bank yards) (Alternatives Three and Five). This would be the equivalent of between 8,600 and 8,800 trucks with a capacity of 6 bank meters (8 bank yards). Construction of the proposed underground garage on Assessor's Block 202 would require approximately 38,500 bank meters (50,000 bank yards) of excavation.

Workers involved in excavation could include machine operators, truck drivers, inspectors, surveyors, and laborers preparing the area for final grading. The likely routes of exposure to contaminants potentially contained in excavated fill, include: inhalation from dust, absorption through exposed skin areas, and ingestion. The public, while not permitted access to the site, could be exposed through inhalation, if dust were carried off-site by wind. Ingestion and absorption would be unlikely routes of exposure for the public and any individuals not permitted access to the site.

Disposal of excavated materials at landfill facilities would be an indirect effect of the project. The excavated fill materials from project construction would be either treated on-site for subsequent on- or off-site disposal or moved directly off-site for treatment and for disposal. Disposal of project-generated wastes at any facility would diminish that facility's capacity and life.

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[52] One bank meter is equivalent to one cubic meter of unexcavated material. Once excavated, the volume will expand to 1.20 to 1.50 times the unexcavated volume, depending on the type of material.

Article 20 of the San Francisco Municipal Code (Article 20) requires that site history research, collection and analyses of soil samples, and certification that no hazardous wastes are causing or likely to cause significant environmental or health and safety risks prior to issuance of a building permit for site construction in areas within Article 20 jurisdiction. The status of completion of these activities for the study area is described below.

Site History. Site history research has been performed for the entire study area. The results of site history research indicated the potential for hazardous materials to be present in subsurface soils in all sections of the study area.

Soil Testing. The analysis of soil samples performed during previous investigations indicate the presence of hazardous substances in the subsurface materials within the study area; the samples from Bay mud indicate that hazardous substances are not present at levels exceeding regulatory thresholds.

Site Mitigation Plan. According to Article 20, a Site Mitigation Plan (SMP), prepared by a qualified person, must be submitted to the Director of Public Works and the Director of Public Health if soil sampling and analysis indicate that hazardous wastes are present in the soil on a site subject to Article 20. The SMP must contain a determination as to whether the hazardous materials in the soils are causing or are likely to cause significant environmental or health and safety risks, and if so, recommend measures to mitigate the risks potentially caused by the presence of hazardous waste in the soil (Article 20, Section 1004). The primary elements of an SMP should include:

- Measures to prevent potential exposure to contaminants during construction activities;
- A Health and Safety Plan;
- Procedures for management of stockpiled materials; and
- Measures to prevent potential exposure to contaminants during the life of the project.

Specific contents of an SMP are determined by site-specific conditions. An SMP has been prepared for a combination of Waterfront Transportation Projects and submitted to San Francisco Department of Public Works (DPW). That SMP, which includes portions of the proposed build alternatives along The Embarcadero, has been reviewed and approved by San Francisco Department of Public Health (SFDPH) and would be implemented by DPW as part of the current project. DPW, Bureau of Construction Management would require contractors to comply with the SMP, including preparation and implementation of a site-specific health and safety plan during construction activities. (See mitigation discussion, below.) The SMP also requires that the contractor handle all hazardous wastes in accordance with applicable Federal and State regulations. This woul.d pertain to the transport and disposal of hazardous wastes, as well as all appropriate record keeping. In addition to site-specific soil management procedures, the SMP requires that the contractor notify the City if unusual materials are encountered in the excavations; a City representative would be present during construction and would implement remedial actions and sampling activities to determine the actions to be undertaken to manage unusual materials encountered in order to ensure adherence to local, State, and Federal requirements. A copy of the SMP is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street.

Mitigation Measures

- To mitigate the potential effect of exposing workers to hazardous materials during construction, the City would require contractors to comply with the Site Mitigation Plan (SMP) approved for the Waterfront Transportation Projects, including preparation and implementation of a site-specific health and safety plan during construction.

- Procedures for utilities maintenance would be developed and incorporated into the SMP required for all build alternatives as a separate, stand-alone document. These procedures would consist of information on the types of contaminants likely to be encountered during utility maintenance and specific requirements that work can only be carried out in accordance with a health and safety plan. These procedures would be filed with USA (Underground Service Alert) and agencies/departments that have utilities in the vicinity of the build alternatives.

4.15 CULTURAL RESOURCES

Under Section 106 of the National Historic Preservation Act of 1966, three possible findings of effect can be made for historic properties (including historic architecture and archaeological resources) listed on the National Register of Historic Places, or found to meet National Register eligibility criteria: (1) No Effect; (2) No Adverse Effect; or (3) Adverse Effect. Adverse effects include physical destruction, damage or alteration; isolation of the property from its setting; introduction of visual, audible, or atmospheric elements that are out of character; neglect of a property resulting in its deterioration or destruction; or transfer, sale, or lease of the property. The State Historic Preservation Officer concurred with the findings contained within a Historic Properties Survey Report (HPSR) and Evaluation of Effects (September, 1994)[53] prepared for the proposed project, which concluded that none of the project alternatives would adversely affect historic architectural resources and that additional steps must be taken to ensure no adverse effect on archaeological resources. (See mitigation discussion, p. 461-462.)

4.15.1 HISTORIC ARCHITECTURAL RESOURCES

Section 3.11.1 identifies all historic architectural resources located within the project's APE, including seven properties that are in the National Register, four properties previously determined potentially eligible for the National Register, and 25 properties and a portion of one historic district that appear eligible for the National Register. In addition, within the APE there are four San Francisco Landmarks, 50 buildings in the 1976 Department of City Planning Citywide Architectural Survey, 43 buildings in the Heritage Survey, 35 buildings in the Downtown Plan Survey, and 43 buildings in the Unreinforced Masonry Buildings (UMBs) Survey. Historic properties adjacent to the Embarcadero Roadway include the Ferry Building, Agriculture Building, Audiffred Building, and the Embarcadero YMCA.

Operational Impacts

None of the proposed alternatives would alter or destroy adjacent or nearby historic resources, or constrain their use in any way. Each of the build alternatives would construct or rehabilitate nearby road surfaces, sidewalks, landscaping, and below-grade features; none would separate or alter features of historic buildings' settings which contribute to their significance. None would reconstruct the elevated Embarcadero Freeway or the Terminal Separator Structure, or introduce other visual features out of character with existing historic buildings and their existing settings. When compared to pre-earthquake conditions, all project alternatives would improve the setting of historic architectural resources within the project area. When compared to existing conditions, traffic volumes in the vicinity might increase under some of the alternatives, however, they would not exceed levels experienced prior to the 1989 earthquake, when the elevated freeway came within fifty feet of these buildings, and would not impair the use or significance of any building. Pedestrian and vehicular access to all historic buildings would be maintained.

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[53] A copy of the HPSR and Evaluation of Effects is available for review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

Construction Period Impacts

Construction of the Embarcadero roadway between Folsom Street and Broadway, under all build alternatives (Alternatives Two through Five), would require 16 months. The F-Line light rail alignment in the roadway median would require another four months. Therefore, total duration for construction in the Embarcadero corridor would be 20 months. The Fremont Street off-ramp realignment proposed under Alternatives Three, Four, and Five would require 12 months, and would be completed concurrently with the completion of the Embarcadero and F-Line construction. The new Harrison Street on-ramp to I-80 westbound proposed in Alternatives Three and Five would take 21 months to complete. The new I-80 eastbound off-ramp at Second Street (Second Street Option of Alternatives Three and Five) would require 15 months, while the widening of the existing Fourth Street off-ramp (Fourth Street Option of Alternatives Three and Five) would require 18 months. Traffic improvements in City streets and operational changes included in all build alternatives would require two-five months and would fall in the 20-21 month overall construction period for all build alternatives.

Historic properties located along the Embarcadero corridor would be the most likely to experience adverse construction-period effects. (See Figure 3.11-1 for locations.) These include:

- Aûdiffred Building .... National Register Status: Listed (May 10, 1979)
- Agriculture Building .... National Register Status: Listed (December 1, 1978)
- Ferry Building .... National Register Status: Listed (December 1, 1978)
- YMCA Building .... National Register Status: Eligible
- Seaman's Institute Building .... National Register Status: Potentially Eligible
- Hotel Admiral .... National Register Status: Potentially Eligible
- Pier 1-5 Bulkheads .... National Register Status: Potentially Eligible

Historic buildings along The Embarcadero could experience dust accumulation on building facades, increased noise and vibration from construction equipment, and changes in circulation and access. The proposed project would be constructed in segments, so impacts could occur at given locations at various times during the course of construction. All of these potential impacts, however, would be temporary and all would be mitigated by implementing the measures described in the Noise, Air Quality, and Topography, Geology, Soils and Seismicity sections of this EIS/EIR. All other historic resources located in the project study area (listed and shown in Table 3.11-1 and Figure 3.11-1) are at least one block away from proposed alignment, and would not be affected by construction.

Construction-related noise and vibration can adversely affect historic architectural resources. Increased noise levels diminish the attractiveness of these resources' setting, as well as disrupt workers in these structures. Construction activities would increase noise levels in the project area for a total of about 20 to 21 months, depending on which alternative is implemented. As noted above, the duration of construction-period noise impacts to a specific historic resource would occur at given locations at various times during the course of construction. During construction, noise levels at a given location would vary depending upon the type of equipment being used, its location on the site, and the amount of time that the equipment is operated in its noisiest mode. Increased noise levels during construction would be mitigated through measures discussed in the Noise section of this document. (Potential noise impacts of the proposed project and mitigation measures are examined in greater detail in Section 4.7.)

Foundations of existing structures that are adjacent to construction sites may experience settlement and/or vibration due to construction activities such as dewatering, excavation, and pile driving. For all alternatives, dewatering would be confined to the limits of the excavation and would therefore not impact existing adjacent structures and utilities. Shallow excavations would not undermine the foundations of the adjacent historic properties which are pile-supported. Ground vibration could result from pile driving activities. Ground vibrations could adversely affect historic architectural resources by weakening foundations and loosening or dislodging delicate interior and exterior materials. Section 4.11 Topography, Geology, Soils, and Seismicity describes construction techniques and mitigation measures for potential settlement, and contains a number of additional mitigation measures set forth that would be applicable for protecting historic architectural resources located adjacent to the proposed project alignment. These include a predesign/construction survey of existing structures adjacent to the project area and installation of survey points on adjacent buildings during construction to monitor their movement.

Increased dust levels in the atmosphere during project construction could soil and possibly damage the facades of historic architectural resources along the proposed project alignment. If construction dust emissions have an acidic chemical content or a high concentration of lime or concrete, chemical reactions with glazed terra cotta and/or marble surfaces could occur, potentially damaging to historic building facades. Dust suppression mitigation measures outlined in Section 4.8 Air Quality would be put into effect during construction; these measures include requiring the general contractor to sprinkle excavation sites with water and cover stockpiles of soil, sand and other such materials.

Potential impacts to historic structures could occur if pedestrian access to and from these structures, or at building entry points, is changed substantially. All build alternatives could result in changes in motor vehicle and pedestrian access to and from the waterfront during surface roadway construction, including traffic reroutings and the closure of sidewalks. Delays at key intersections could occur. Regardless of which build alternative is implemented, pedestrian access and entry points to the historic resources along the waterfront would be maintained at all times during project construction. (See Section 4.5 for more discussion of changes in travel patterns resulting from the proposed project.)

4.15.2 ARCHAEOLOGICAL RESOURCES

Potential impacts to buried archaeological resources could occur as a result of construction-related activities such as subsurface foundation construction, pile driving and removal or grubbing out of existing below-grade remnants of formerly elevated segments of the Embarcadero Freeway and Terminal Separator Structure. All of these activities would involve subsurface excavation that could damage or destroy potentially significant archaeological resources within the project area. No additional impacts to archaeological resources would occur once the project is completed and operational.

Potential secondary impacts would result from unauthorized digging or looting of artifacts by construction workers or unauthorized individuals during construction. Such activities could threaten potential subsurface historic assemblages along the project alignment.

At the recommendation of Caltrans staff, the analysis of archaeological issues prepared in compliance with Section 106 of the National Historic Preservation Act has not resulted in a specific Finding of Effects, but has used a "Treatment Plan" aproach. Under this approach, additional research and pre-construction testing, along with a series of mitigation measures, would be agreed to in a Memorandum of Understanding (MOU) to be executed following selection of the preferred alternative, and prior to completion of the Final EIS/EIR. The summaries of effects below are preliminary only and are based on existing information.

Alternative Two: Mid-Embarcadero Roadway

This alternative would result in construction of The Embarcadero between Folsom Street and Broadway. No construction or reconstruction of ramps would occur under this alternative. Construction of the Embarcadero roadway would not involve substantial excavation and would disrupt only the upper several feet of fill along The Embarcadero which would not contain cultural material. However, some sub-surface excavation up to eight feet deep is anticipated as part of installation of utilities. Therefore, potential archaeological resources may be threatened.

Alternative Three: Mid-Embarcadero Roadway and New Peninsula Access Ramps

This alternative would require the construction of access ramps and realignment of the Fremont Street off-ramp. This construction would involve excavation activities which could impact cultural material. Realignment of the Fremont Street ramps could affect resources on Assessor's Block 3737.

Construction of the Peninsula access ramps under Alternative Three-Second Street Option could also affect resources on Assessor's Blocks 3764 and 3763.

Modification of the Fourth Street off-ramp under the Fourth Street Option of Alternative Three could affect resources on Assessor's Blocks 3762, 3761, and 3760. Resources along the Embarcadero Corridor could be affected as described for Alternative Two, above.

Alternative Four: Mid-Embarcadero Roadway and Traffic Modifications

This alternative would require the reconstruction of the Fremont Street ramp. This construction would involve excavation activities which could impact cultural material. Realignment of the Fremont Street ramps could affect resources on Assessor's Block 3737.

Some sub-surface excavation up to eight feet deep is anticipated as part of installation of utilities in the Embarcadero corridor. Therefore, the potential archaeological resources along the embarcadero corridor may also be threatened, as described in Alternative Two, above.

Alternative Five: Curved Mid-Embarcadero Roadway with New Peninsula Ramps

This alternative would have the potential to affect the same resources as Alternative Three above.

Other Impacts

As discussed in Section 4.6, construction of an underground parking structure under Assessor's Block 202 is one possible way to compensate the Port for the loss of parking revenue. Construction of a subsurface parking garage in this location could result in significant impacts to archaeological resources including the ship Elizabeth, other unknown ships, undocumented domestic and commercial buildings/sites, and fill from the City building Period (1880s-1890s).

Archaeological resources which may be found during construction and are found eligible for the National Register under Criterion D, have a high probability of being important for data recovery and would not warrant preservation in place.

Mitigation Measures

The Historic Properties Survey Report (HPSR) and Evaluation of Effects prepared for this project includes a number of recommendations for the protection of potentially affected archaeological resources in the project area. Specific mitigation measures consistent with these recommendations to protect archaeological resources will be developed through consultation with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic

Preservation (ACHP). This consultation process will result in a Memorandum of Agreement (MOA) to be executed among and between the City and County of San Francisco, the Federal Highway Administration (FHWA), the California Department of Transportation (Caltrans), SHPO, and ACHP, after selection of a preferred project alternative, and will describe the measures to be taken to reduce or eliminate adverse effects. The recommendations include:

- Undertake expanded, detailed archival research on the Northern (Mid-Embarcadero) portion of the Project APE to bring documentation and identification of potential archaeological resources in that area up to the degree of specificity achieved for the Southern area. This should be undertaken and the results presented in the same block-by-block format employed in the Southern area. This effort should include the area of the Parking Remediation Option in Assessor's Block 202.
- Formulate and implement a testing/evaluation/data recovery program for indicated archaeological resources.
- If the subsurface parking structure remediation option on Assessor's Block 202 is selected, formulate a testing/evaluation/data recovery program for archaeological resources on the block. This would include a search for and evaluation of the Elizabeth which might be buried on that block.
- An archaeological monitoring program should be formulated and implemented during construction related drilling or excavation for all locations.
- Formulate and implement a program of health and safety procedures for monitoring and testing/evaluation procedures where toxic materials have been identified or are suspected. This program should be developed by a qualified professional. Such procedures may include special training, use of protective clothing or specialized equipment, as well as implementation of specific cautions/procedures.
- In the event that buried cultural materials are unearthed during site preparation, grading, or construction of the project, work would be halted in the vicinity of the find until a qualified archaeologist can assess its importance.
- A report of findings resulting from archaeological testing/evaluation/data recovery procedures should be compiled and submitted at the conclusion of field work and analysis. Significant artifacts and samples should be prepared and curated at an appropriate facility after completiion of research and report preparation.

4.16 GROWTH INDUCEMENT

The forecast of employment in San Francisco in the year 2015 for no action scenario[54] anticipates a citywide increase of 130,010 jobs between 1993 and 2015, to a total of 686,100 at the end of the forecast period. The forecast goes on to allocate base case employment between downtown and vicinity and the rest of the City: in the year 2015, 459,950 jobs, or 67 percent of all jobs in San Francisco, are expected to be in downtown and vicinity. To accommodate the employment growth in the greater downtown area would require the development of approximately 0.6 million square meters (6.7 million square feet) of new office and retail space (see Section 4.1.3 for additional discussion of this growth forecast).

Growth inducement would occur as a result of one or more of the project alternatives if the amount of employment growth in San Francisco that takes place with that alternative is greater than the amount that would take place in the base case (no action scenario). This project is different from typical road improvement projects, which can stimulate growth by extending a new road into undeveloped land at the edge of a city improving access to vacant or underdeveloped land. The current project would revise access to and within an already-urbanized area. In this case, differences in Citywide employment between the base case forecast and the alternative cases, as well as differences in downtown area employment, could occur if the alternatives create the following types of changes in the conditions that affect employment growth:

- Creation of additional effective land supply. If base case employment growth in either the City as a whole or in the downtown would be constrained by a lack of developable sites, and one or more of the project alternatives would increase the supply of land so that such a constraint is removed, then the amount of employment could increase.

- Creation of different types of developable sites. As Bay Area employment has become increasingly dispersed throughout the region, San Francisco has continued to attract and retain those jobs that are most effective when located in a densely concentrated employment center. Jobs that prefer lower density environments, such as business parks, have been more likely to locate or relocate in suburban locations, such as Alameda and Contra Costa counties; jobs that benefit from the electronics agglomeration of the Silicon Valley have been more likely to locate in the South Bay.

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[54] "No action" is defined as the case in which the demolished Embarcadero Freeway and Terminal Separator Structure facilities are not rebuilt on their previous sites and the parcels vacated by demolition of those facilities are not made available for development.

To determine whether potential development sites vacated by removal of the Embarcadero Freeway and the Terminal Separator Structure would meet either of these definitions and induce growth depends on both "big picture" considerations and local factors.[55]

Downtown San Francisco's projected growth through the study period (to 2015) would not be constrained by a lack of sites: a combination of projects in the pipeline, more intensive use of existing space, and a considerable potential capacity will be adequate to meet forecast employment needs without the addition of the particular sites addressed by the study. Furthermore, because the sites are relatively small, in an intensively developed urban context, and lacking in the potential for substantial parking and landscaping (such as characterizes campus-type development in more suburban settings), these sites would not attract a different kind of development than downtown San Francisco has historically attracted.

The sites that are made available for development as a result of implementing each alternative are expected to rearrange employment growth that would otherwise have occurred in San Francisco, but not to induce employment growth compared to the base case. The development that would locate on sites vacated by the demolition of the Embarcadero Freeway and the Terminal Separator Structure is expected to be comprised primarily of development that would otherwise have located in San Francisco, either within the downtown area or in the vicinity which includes such neighborhoods as Fisherman's Wharf, Russian Hill, Nob Hill, China Basin, and Mission Bay. Therefore, the amount of development expected to locate in the study area (that is, downtown and vicinity) is essentially the same in all alternatives. The exception to this general statement is that the amount of retail space would vary somewhat, increasing in the alternatives that make more land available for development (assuming that the ground floors of new residential or commercial buildings would be devoted to retail use, consistent with existing City policy.

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[55] For more details regarding growth inducement potentials, please see the "Growth Inducement" section of the Land Use/Socio-economic/Growth Inducement Background Report. A copy of this report is available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street, San Francisco.

While the availability of the vacated and adjacent sites would not be growth inducing, it may allow for new space to be provided at a lower cost than it could have been at other locations. This effect is important, because it could increase the incentives for companies that are currently located in San Francisco to remain in the City; at the least, it would reduce the cost-related incentives to relocate to outlying areas. Thus all alternatives which would make more sites available for development (than were available before the earthquake) would strengthen San Francisco's existing economic base even if they would not induce additional growth.

5. THE RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

All build alternatives would reconfigure the roadway along the Embarcadero between Folsom Street and Broadway, eliminating surface parking lots that currently lie in the roadway median. Reconfiguration would result in widened pedestrian facilities and new Class Three bicycle lanes, and would accommodate construction of an expanded MUNI bus layover facility at The Embarcadero and Mission Street and the planned MUNI F-Line (light rail) extension in the Embarcadero roadway median.

Alternatives Three, Four, and Five would also eliminate a portion of the surface parking area at the northeast corner of Fremont and Folsom Streets, and would reconfigure an existing freeway off-ramp at this location. Alternatives Three and Five would eliminate additional surface parking at the southeast corner of Second and Harrison Streets, and would introduce a new freeway on-ramp at this location. The Second Street Option of Alternatives Three and Five would eliminate surface parking between the mainline freeway, Stillman, Second and Third Streets, and would construct a new freeway off-ramp at this location. The Fourth Street Option of Alternatives Three and Four would not eliminate parking along Stillman Street, but would instead eliminate about 270 square meters (1200 sq.ft.) of the landscaped area south of the existing Fourth Street off-ramp, and would use a portion of existing right-of-way to widen the mainline freeway between Sixth Street and the off-ramp, bringing the mainline freeway 3.6 meters (12 feet) closer to the rear of buildings on the north side of Bryant Street between Sixth Street and Fourth Street.

All build alternatives would use 34 square meters (375 sq. ft.) of the plaza area in front of the Bayside Plaza office building at the corner of Howard Street and The Embarcadero. This plaza area is within the right-of-way of the former elevated Embarcadero Freeway. All build alternatives would also narrow sidewalks in several locations, including the east side of Third Street at Market Street, the Market Street "island" between Third Street and Kearny Street, and the west side of Fremont Street at Market Street. In addition, Alternatives Three and Five would reopen Davis Street between Clay and Washington Streets to vehicular traffic. This section of Davis Street is currently a landscaped pedestrian walkway, and is a mapped but unimproved street that was closed due to construction of the Clay and Washington Street Ramps to/from the Embarcadero Freeway in the 1950s.

As required by Federal right-of-way rules, the project would compensate the Port for revenue loss due to parking displacement either through construction of an underground parking structure of up to 340 parking spaces beneath Block 202 and adjacent portions of Washington Street, or by direct monetary compensation.

All of the land use changes described above would involve "use" of portions of the urban environment, and are proposed so that the project, if implemented, would meet the purpose and need described in Section One. In general, all build alternatives would enhance automobile access to this area of the City relative to existing conditions, while also causing or contributing to localized congestion, primarily along routes providing access to the regional freeway system. Enhancement of automobile access would benefit the long-term economic productivity of downtown San Francisco and adjacent neighborhoods.

Compared to pre-earthquake conditions, the proposed project would not rebuild the elevated Embarcadero Freeway or the Terminal Separator Structure, and would therefore not provide the same automobile access as the pre-earthquake structures and would not reuse all sites that were used by these facilities. Instead, the project would maintain existing views of the waterfront, and some or all unused sites, which would total between about 7.3 and 8.5 hectares (18 and 21 acres) depending on the alternative selected, would be sold and/or made available for other uses. Until specific future uses are proposed on these sites, it would be speculative to weigh the benefits of their use against either environmental impact or long term productivity.

All build alternatives would further enhance environmental conditions in downtown San Francisco by providing stormwater conveyance facilities along The Embarcadero. The new facilities would capture water runoff from the areas Bay-ward of the centerline of The Embarcadero which currently drain directly to the Bay, and would direct the water to the City's combined sewer system.

6. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Construction of the proposed project would require between 3.4 and 4.2 million liters (.6 to 1.1 million gallons) of fuel and would cost between 62 and 103 million dollars.

Preparation of the roadbed along the Embarcadero between Folsom Street and Broadway, including utilities relocation, stormwater system construction, and removal of remaining Embarcadero Freeway foundations, would require excavation of up to about 34,200 bank meters (45,000 bank yards) of soil. Ramp components of Alternatives Three, Four, and Five would require excavation of up to an additional 760 bank meters (1,000 bank yards). Expansion of soils during excavation could increase these estimated soil volume by 20 to 50 percent. Disposal of excavated materials not reused on the site would diminish the capacity of landfill facilities.

7. UNAVOIDABLE ADVERSE EFFECTS

In accordance with Section 1502.16 of the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA), with Section 21067 of the California Environmental Quality Act (CEQA) and with Section 15040, 15081, and 15082 of the State CEQA Guidelines, the purpose of this section is to identify impacts that could not be eliminated or reduced to an insignificant level by mitigation measures included as part of the project, or by other mitigation measures that are under consideration, as described in Section Four.

This section is subject to final determination by the City Planning Commission as part of its certification of the proposed Final EIR. The Final EIR will be revised following certification, if necessary, to reflect the findings of the Commission.

The proposed project would involve physical changes in an area of San Francisco which Is the site of intense activity, and therefore a focus of public attention. As described in Section Two, all build alternatives would involve realignment of the Embarcadero roadway between Folsom Street and Broadway, reconfiguration of pedestrian facilities and provision of bicycle facilities within the same area, and a package of more minor operational and physical changes throughout the downtown area. Alternatives Three, Four, and Five would also modify existing freeway ramps, and/or construct new ramps to provide access to and from the regional freeway system. None of these physical changes, in and of themselves, would constitute significant environmental impacts when compared with environmental conditions under the pre-earthquake and existing setting.

None of the project alternatives would reconstruct the elevated Embarcadero Freeway or Terminal Separator Structure which existed prior to the 1989 Loma Prieta Earthquake. The decision not to rebuild these elevated structures does not, in and of itself, constitute a significant environmental impact because all alternatives would tend to perpetuate existing environmental conditions. It's estimated that the average travel time between the mainline freeway and areas north of the Financial District have increased about three to five minutes over the average pre-earthquake travel time, inconveniencing drivers, but adding a small increment to most trips.

Cumulative growth in downtown San Francisco and vicinity (which includes the project area) would contribute to cumulative traffic increases and unacceptable levels of congestion at selected local intersections when compared to pre-earthquake and existing conditions. Build alternatives would improve projected future conditions at many intersections, and would contribute to or worsen congestion at other intersections. Operational improvements being considered by the City, including modifications to Battery Street and Harrison Street (see pp. 285-286), would shift and/or improve levels of congestion at some locations. Table 7.1-1 below summarizes future cumulative conditions and project related changes in terms of intersection LOS.

As shown in Table 7.1-1, all build alternatives would improve projected future conditions at the intersections of Battery/Bush, Third/Market, and Bryant/Embarcadero, which would function at unacceptable Levels of Service (LOS E or F) during the AM and/or the PM Peak Hour under the 2015 no build alternative, and would operate at LOS C or better under the build alternatives. All build alternatives would also perpetuate unacceptable cumulative future conditions (LOS E) in the PM Peak Hour at the intersections of Fourth/Harrison and Fourth/Folsom.

Alternatives Three and Five would cause the LOS of Fourth/Harrison to degrade to LOS E in the AM Peak Hour. This change, which would be a project-specific significant impact, would occur because Alternative Three and Five propose a new on-ramp to I-80 Westbound (to 101 Southbound), which would require that the existing Fourth Street on-ramp be reconfigured as a merge lane, rather than a "lane-add" which allows traffic to access the mainline freeway without merging.

In addition to the data shown on Table 7.1-1, another project-specific impact would occur at the intersection of The Embarcadero and Broadway under alternatives Three, Four, and Five if development on portions of Assessor's Blocks 202 and 203 occurs in excess of amounts assumed. The intersection would deteriorate to LOS E in the PM peak hour if development approached the maximum scenarios described in the Possible Future Projects section, pp. 300-314.

Future cumulative increases in traffic would affect the freeway system and freeway-ramp connections. The demand-to-capacity ratio of freeway off-ramps (between the Bay Bridge and the I-80/U.S. 101 merge) in the A.M. Peak Hour would degrade to values greater than one (i.e., demand would exceed capacity) under future cumulative (No Build) conditions. Alternatives Two and Four would perpetuate this condition. Alternatives Three and Five would decrease (improve) the ratio from 1.02 to .92 or better. Peak hour average speeds on the freeway and

TABLE 7.1-1

INTERSECTIONS WITH LEVELS OF SERVICE E AND F IN THE AM AND PM PEAK HOURS UNDER 2015 NO BUILD CONDITIONS AND MITIGATED PROJECT ALTERNATIVES

AM Peak Hour Intersections	No Build	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Battery/Bush	LOS E	LOS D	LOS D	LOS D	LOS D
Third/Market	LOS E	LOS C	LOS B	LOS C	LOS B
Bryant/Embarcadero	LOS F	LOS C	LOS C	LOS C	LOS C
Fourth/Harrison	LOS B	LOS B	LOS E	LOS B	LOS E
PM Peak Hour Intersections					
Battery/Bush	LOS F	LOS D	LOS D	LOS D	LOS D
Third/Market	LOS F	LOS B	LOS B	LOS B	LOS B
Bryant/Embarcadero	LOS E	LOS B	LOS B	LOS B	LOS B
Fourth/Harrison	LOS E	LOS E	LOS E	LOS E	LOS E

Source: Korve Engineering

on the freeway-plus-ramps would decrease from between approximately 27 to 36 mph under existing conditions to between about 12 to 25 mph in 2015 due to future cumulative growth. Build alternatives would result in average speeds of between 11 and 23 mph. (See pp. 289-292.)

Future cumulative traffic conditions on local streets, freeway ramps, and on the freeway would be worse than described here (i.e., congestion would increase, speeds would decrease, and the duration of "peak" conditions would expand) if possible future projects discussed in the traffic impacts section (pp. 300-314) are implemented. Specifically, additional intersections along The Embarcadero, and along Fourth and Fifth Streets would deteriorate to unacceptable levels of service in the PM peak hour. Also, congestion could occur at the Folsom/Fremont intersection, and demand could exceed capacity on some freeway off-ramps in the PM peak period.

These cumulative effects could occur regardless of whether one of the alternatives to replacement of the Embarcadero freeway and the TSS is adopted, but would likely be most severe under the no build alternative, which would make no improvements to the Embarcadero and other local streets. Alternatives Three and Five would offer the greatest number of connections between the freeway and local streets, but would also have higher volumes and greater congestion than Alternatives Two and Four.

As described in Section 4, pp. 459-462, the proposed project has the potential to affect archaeological resources that may exist in the vicinity of the project. Existing resources may be eligible for the National Register, and may experience unavoidable adverse impacts pursuant to criteria contained in Section 106 of the National Historic Preservation Act of 1966. a specific finding of Effect pursuant to Section 106 cannot be determined prior to completion of the pre-construction testing program because of uncertainty regarding the location and integrity of archaeological resources. A Memorandum of Agreement containing specific measures to reduce or eliminate potential adverse effects will be executed among and between the City and County of San Francisco, the Federal Highway Administration, the California Department of Transportation, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation. Mitigation measures will incorporate recommendations specified on p. 462, and the Memorandum of Agreement will be included in the Final EIS/EIR. Given the amount of information available as of publication of the Draft EIS/EIR, the project could have a significant adverse effect on archaeological resources.

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DEPARTMENT OF TRANSPORTATION **APPENDIX A**	Contract No.	Sheet of

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

(1) **Compliance with Regulations:** The contractor shall comply with regulations relative to Title VI (non-discrimination in federally-assisted programs of the Department of Transportation - Title 49 Code of Federal Regulations Part 21 - Effectuation of Title VI of the 1964 Civil Rights Act). Title VI provides that the recipients of federal-assistance will implement and maintain a policy of non-discrimination in which no person in the state of California shall, on the basis of race, color, national origin, religion, sex, age, disability, be excluded from participation in, denied the benefits of or subjected to discrimination under any program or activity by the recipients of federal assistance or their assignees and successors in interest.

(2) **Non-discrimination:** The contractor, with regard to the work performed by it during the contract shall act in accordance with Title VI. Specifically, the contractor shall not discriminate on the basis of race, color, national origin, religion, sex, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the U.S. DOT's Regulations, including employment practices when the contract covers a program whose goal is employment.

(3) **Solicitations for Subcontractors, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to non-discrimination on the grounds of race, color or national origin.

(4) **Information and Reports:** The contractor shall provide all information and reports required by the Regulations, or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the State Department of Transportation or the Federal Highway Administration to be pertinent to ascertain compliance with such Regulations or directives. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the State Department of Transportation, or the Federal Highway Administration as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) **Sanctions for Noncompliance:** In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the State Department of Transportation shall impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

(a) withholding of payments to the contractor under the contract until the contractor complies, and/or

(b) cancellation, termination or suspension of the contract, in whole or in part.

(6) **Incorporation of Provisions:** The contractor shall include the provisions of paragraph (1)through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor will take such action with respect to any subcontractor or procurement as the State Department of Transportation or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the State Department of Transportation to enter into such litigation to protect the interest of the State, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

COMMENTS AND COORDINATION

Early coordination with the general public and appropriate public agencies is encouraged in the environmental review process in order to determine the scope of the environmental document, the level of analysis, and related environmental requirements. Agency consultation and public participation for this study have been accomplished through a variety of formal and informal methods including project team meetings; interagency coordination meetings; public scoping meetings; interviews and briefings with community leaders, agencies and elected officials; and public hearings following the circulation of this document.

AGENCY COORDINATION

The proposed alternatives to replacement of the Embarcadero Freeway and the Terminal Separator Structure (TSS) are subject to both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The Federal Highway Administration (FHWA), the California Department of Transportation (Caltrans), and the City and County of San Francisco are serving as the lead agencies to prepare a combined Environmental Impact Statement and Environmental Impact Report (EIS/EIR) to analyze the potential environmental consequences of the proposed project, consistent with both NEPA and CEQA.

Agency coordination for this study has been accomplished through the review of draft documents and through monthly meetings between City, Caltrans and FHWA.

Below is a list of governmental agencies that were either actively consulted during project scoping or were kept apprised during the process. Formal responses from some of these agencies are included at the end of this section.

FEDERAL AGENCIES

- Department of the Interior
- Environmental Protection Agency
- Federal Highway Administration
- US Fish and Wildlife Service

STATE AGENCIES

- California Air Resources Board
- California Lands Commission
- California Transportation Commission
- Department of Fish and Game
- Department of Parks and Recreation
- Department of Transportation
- Department of Water Resources
- Office of Historic Preservation
- Regional Water Quality Control Board
- Resources Agency

REGIONAL AGENCIES

- Association of Bay Area Governments
- Metropolitan Transportation Commission
- Bay Conservation and Development Commission
- Bay Area Air Quality Management District

LOCAL AGENCIES AND JURISDICTIONS

City and County of San Francisco, Chief Administrative Officer

- Port of San Francisco
- San Francisco Planning Department
- San Francisco Department of Public Works
- San Francisco Department of Parking and Traffic
- San Francisco Recreation and Park Department
- San Francisco Port Commission
- San Francisco Redevelopment Agency

TRANSIT AGENCIES

- AC Transit
- Bay Area Rapid Transit District (BART)
- Golden Gate Bridge, Highway and Transportation District (GGBHTD)
- San Mateo County Transit District (SamTrans)
- San Francisco Municipal Railway

- San Francisco Municipal Railway
- Ferry Operators

PUBLIC PARTICIPATION

Ensuring meaningful public participation has been a paramount concern throughout the process of developing the alternatives for the Project. Beginning in 1991, the formally organized Citizens Advisory Committee (CACEP) devised the initial alternatives. The TSS alternatives were developed by a separate ad hoc committee, and were presented to the Office of the Mayor in July, 1993.

Two public scoping meetings were held by City officials to solicit comments on the proposed scope of an EIS/EIR. Prior to the public meetings, official notice was posted through paid advertisements in the *Sunday San Francisco Chronicle/Examiner* and the *San Francisco Independent* and notices sent to more than 2,000 individuals, organizations and government agencies interested in the project. An information packet was distributed to all in attendance which included a registration card to identify those wishing to make verbal comments; a workbook containing agenda background information, schematic drawings and written descriptions of the alternatives under consideration and glossary of terms and abbreviations; a comments form and an evaluation form.

The first public scoping meeting was held September 14, 1992 and was attended by seventy-two people. During the meeting, comments were received from representatives of the San Francisco Chamber of Commerce, San Francisco Tomorrow, the Sierra Club, the Russian Hill Improvement Association, the Small Business Development Corporation, the Telegraph Hill Dwellers, the Golden Gateway Center, the Port's Waterfront Plan Advisory Board, and the Citizen's Advisory Committee on the Embarcadero Project (CACEP). Numerous individuals also presented verbal or written comments.

To encourage public comment, the period for acceptance of written comments was extended to September 30, 1992. Fifty-two written comments were received by the Office of Environmental Review (OER). Six comments came from governmental agencies.

A second scoping meeting was held February 28, 1994. Ninety-seven people attended the meeting, including 21 representatives of government agencies and four media representatives.

Twelve people gave oral testimony and 51 letters were received from 88 signatories. Staff from five government agencies sent letters and 16 submitted comment forms.

Letters from individuals, and organizations, and summaries of written and verbal comments received at the two public scoping meeting are available for review by appointment at the San Francisco Planning Department located at 1660 Mission Street, Fifth Floor, San Francisco, 94103. Letters from Public Agencies are included in the following pages.

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

In Reply Refer To:
1-1-92-SP-1327

September 23, 1992

Ms. Barbara Sahm
Environmental Review Officer
City and County of San Francisco
Department of City Planning
450 McAllister Street
San Francisco, California 94102

Subject: Species List for the Proposed Mid-Embarcadero Roadway Replacement Project

Dear Ms. Sahm:

This is in reply to your letter of August 21, 1992, requesting a list of listed and proposed endangered and threatened species that may occur within the area of the subject project. Your request and this response are made pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended.

We have reviewed the most recent information and to the best of our knowledge there are no listed or proposed species within the area of the project. We appreciate your concern for endangered species and look forward to continued coordination. If you have further questions, please contact the Section 7 Coordinator of this office at (916) 978-4866.

Sincerely,

Gail C. Kobetich

for Wayne S. White
Field Supervisor

STATE OF CALIFORNIA—THE RESOURCES AGENCY ~~GEORGE DEUKMEJIAN~~, *Governor*

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-5500

September 16, 1992

OFFICE OF
ENVIRONMENTAL REVIEW

Ms. Barbara Sahm
City and County of San Francisco
450 McAllister Street
San Francisco, California 94102

Dear Ms. Sahm:

Notice Of Preparation
Mid-Embarcadero Roadway Replacement Project

Department of Fish and Game personnel have reviewed the Notice of Preparation of a Draft Environmental Impact Report (DEIR) for the proposed Mid-Embarcadero Roadway Replacement Project. We believe the following issues need to be addressed in the DEIR.

The DEIR should address potential impacts to biotic resources and mitigation measures, as well as alternatives which would avoid impacts. Particular attention needs to be paid to state and federal listed and candidate species, and unlisted species whose status is of regional concern. The California Natural Diversity Data Base (NDDB) should be contacted for a list of sensitive species and communities known to occur in the project vicinity. They may be reached at (916) 322-2495. We request that subsequent documents related to this project be submitted for our review.

Specific measures to adequately mitigate unavoidable impacts need to be incorporated into project design prior to certification of the EIR. The Department recommends the following overall measures to lessen or minimize impacts.

1. Avoidance or minimization of impacts to important wildlife habitats.

2. Revegetation using native species.

3. Conformance with the Department Wetland Policy which requires no net loss of either wetland acreage or habitat value for unavoidable impacts.

4. Require a 50-foot setback from the edge of riparian vegetation to protect riparian habitat.

The Department has direct jurisdiction under Fish and Game Code sections 1601-1603 in regard to any proposed activities that would divert or obstruct the natural flow or change the bed, channel, or bank of any stream. We recommend early consultation since modification of the proposed project may be required to avoid impacts to fish and wildlife resources. Formal notification

Ms. Barbara Sahm
September 16, 1992
Page Two

under Fish and Game Code Section 1603 should be made after all other permits and certifications have been obtained. Work cannot be initiated until a streambed alteration agreement is executed.

The U.S. Army Corps of Engineers also has jurisdiction over the discharge of fill to streams and wetlands under Section 404 of the Clean Water Act. We recommend that the Corps be contacted to determine if they have jurisdiction and if they require a permit.

If you have any questions regarding our comments, please contact Jeannine DeWald, Wildlife Biologist, (408) 429-9252; or Carl Wilcox, Environmental Services Supervisor, (707) 944-5525.

Sincerely,

Brian Hunter

Brian Hunter
Regional Manager
Region 3

KEN KEVORKIAN, Chairman
JEROME F. LIPP, Vice Chairman
OCTAVIA DIENER
JOSEPH A. DUFFEL
DEAN R. DUNPHY
JERRY B. EPSTEIN
DANIEL Wm. FESSLER
WILLIAM E. LEONARD
ROBERT SHELTON

ROBERT I. REMEN, Executive Director

STATE OF CALIFORNIA

PETE WILSON
GOVERNOR

CALIFORNIA TRANSPORTATION COMMISSION
1120 N STREET, P.O. BOX 942873
SACRAMENTO 94273-0001
FAX (916) 653-2134
FAX (916) 654-4384
(916) 654-4245

October 9, 1992

Hillary Gitelman
Office of Environmental Review
Department of City Planning
City of San Francisco
450 McAllister Street
San Francisco, CA 94102

Dear Ms. Gitelman:

The California Transportation Commission received in early September a Notice of Preparation for an EIR/EIS for the middle section of the Embarcadero Roadway replacement project. The Commission discussed this Notice of Preparation at its October meeting. The Commission makes the following two comments about the alternatives and the types of impacts to be studied and discussed in this EIR/EIS:

1. The Commission is satisfied that the City intends to consider a range of appropriate alternatives for this project, and asks that the City consider all reasonable alternatives suggested as a result of the circulation of the Notice of Preparation so as to forestall future legal disputes that could tie up and delay this most important project that connects a large part of San Francisco to the state highway system.

2. The Commission asks that a full funding package be proposed for each alternative considered, and presented in the Draft EIR/EIS. This will be necessary so that the Commission can use the EIR/EIS to clear its future decision to provide federal and state funding for project construction.

The Commission is a responsible agency for this project. The Commission must allocate $68 million in federal emergency funds and state matching funds already earmarked to the project, and any further state funds that may be programmed. The Commission wants it clearly understood that federal emergency funds and state funds may not be available for all project alternatives. Federal emergency funds, normally available for repair or replacement of a facility damaged or destroyed in a disaster, are being made available in this case for an alternative "comparable facility." The Commission interprets "comparable facility" to mean one that provides connections to Route 80 and the Bay Bridge, since that was the major function of the Embarcadero Freeway which it must replace. Moreover, throughout the discussions between the Commission, the Mayor and the Board of

Supervisors, the only replacement project under consideration was connected to the state system, and it was in that context that the Commission earmarked these funds. Therefore, these funds are being made available only for an alternative that connects to the state system.

The Commission, as a responsible agency, programs transportation improvement projects and must eventually allocate the federal and state funding to be used in building those projects. The Commission will follow with interest the environmental studies and decision on this project.

Sincerely,

KENNETH KEVORKIAN
Chairman

91:GK18

cc: Commissioners
Jim van Loben Sels, Caltrans
Larry Dahms, MTC

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY
PETE WILSON, *Governor*

DEPARTMENT OF TRANSPORTATION
BOX 23660
OAKLAND, CA 94623-0660
(510) 286-4444
TDD (510) 286-4454

City & County of S.F.
Dept. of City Planning
MAR 2 [illegible] 1994
OFFICE OF
ENVIRONMENTAL REVIEW

March 16, 1994

SF-080-5.45
SCH: 94033003
SF080045

Ms. Barbara W. Sahm, Environmental Review Officer
City and County of San Francisco
Department of City Planning
Office of Environmental Review
450 McAllister Street, 5th Floor
San Francisco, CA 94102

Re: Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR)/Draft Environmental Impact Statement (DEIS):

92.202E & 94.060E: Replacement Alternatives for the Embarcadero Freeway and the Terminal Separator Structure.

Dear Ms. Sahm:

Thank you for including the California State Department of Transportation (Caltrans) in the early stages of the environmental review process. We have reviewed the NOP and forward the following comments:

1.) The **Terminal Separator Structure/Transbay Terminal** *Preliminary Report to the Mayor* dated March 16, 1993, points out that "Both federal regulations governing use of ER funds and SB 181 indicate that a replacement transportation facility must be comparable in capacity and character to the previously existing facility. The CTC...reaffirmed that Federal ER and State funds would be available for a Mid-Embarcadero project only if that facility connects to I-80 and the Bay Bridge...." None of the existing proposed alternatives seem to satisfy a.) the comparable in capacity and character requirement and b.) a connection to I-80 and the Bay Bridge. The DEIR/DEIS should address these issues insofar as funding is concerned. Has the City received a waiver of these requirements?

2.) Relative to Alternative 3:

a.) The proposed new on-ramp, starting from Harrison/Essex intersection and crossing over Second Street to connect with w/b 80 and s/b 101 would seem to require a grade exceeding the standard six (6) percent. Even were an exception granted, would the new ramp possibly require the closure of Second Street? If so, what is the impact on City street traffic?

b.) Construction of the proposed Second Street off-ramp may require sliver widening of the existing Bay Bridge approach structure. This may create structural and traffic handling problems.

c.) Construction of the proposed Second Street off-ramp may require either the narrowing of Stillman Street or the closure of Stillman Street at Second Street. Access to businesses along Stillman may be cut off. If so, the acquisition of this right-of-way may be required. The costs of possible right-of-way acquisition should be quantified as part of the project cost.

d.) The proposed Fremont Street off-ramp to Folsom will require a horizontal curve with steep downgrade which could reduce a driver's decision time in determining which direction to take at the foot of the ramp.

e.) To construct the proposed Fremont Street off-ramp closure of the existing Fremont Street ramp may be required. The DEIR/DEIS should address the potential traffic impacts of such a closure on the Bay Bridge and City streets.

3.) Relative to (proposed) Alternative 7:

The DEIR/DEIS should address the costs and construction constraints of building below grade lines in the area between Mission and Washington streets. Will the former Embarcadero Freeway footings be a major and costly constraint?

4.) The DEIR/DEIS should address how each of the alternatives will help improve traffic flow into a.) the Financial District, b.) Chinatown, and c.) North Beach/Fisherman's Wharf.

5.) The impacts on existing and proposed MUNI service and Transbay Terminal bus service should be addressed under each build scenario.

6.) The DEIR/DEIS should clearly state what potential traffic impacts will occur during construction of each alternative. Will a traffic management plan be included in project costs? What elements of a traffic management plan will be necessary for each alternative?

7.) The proposed disposition of land parcels remaining from re-constructing the former Terminal Separator Structure should be disclosed. Who will take possession of these parcels and will the State be compensated if the City decides that the land should be put into residential and/or commercial development?

8.) The air quality impacts of each alternative should be discussed in the DEIR/DEIS.

9.) The DEIR/DEIS should address the impacts of all alternatives on the movement of goods, especially related to truck traffic. Which alternative will best help facilitate the delivery of goods? Will the proposed on/off-ramps at Second Street (Alternative 3) have grades so steep as to inhibit the movement of trucks wishing to use them, and hence, hinder the movement of all traffic in the vicinity?

10.) Now that the Joint Powers Board that governs CalTrain has decided on a preferred station site at Market and Beale streets, how would the construction of each proposed alternative impact these plans, and vice-versa?

We appreciate the opportunity to work with you on this project and wish to continue close correspondence on its development. We look forward to reviewing the DEIR/DEIS. In order to expedite our review, please forward two copies to the following Caltrans contact:

Gary F. Adams, Chief
Caltrans District 4
Transportation Planning Branch
P.O. Box 23660
Oakland, CA 94623-0660

Should you have any questions regarding these comments, please contact Lynne March of my staff at (510) 286-5589.

Sincerely,

JOE BROWNE
District Director

by

BLESILDA H. GEBREYESUS
Senior Transportation Planner

cc: Mike Chiriatti, State Clearinghouse
Craig Goldblatt, MTC
Patricia Perry, ABAG

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY
PETE WILSON, *Governor*

DEPARTMENT OF TRANSPORTATION
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OAKLAND, CA 94623-0660
(510) 286-4444
TDD (510) 286-4454

April 4, 1994

SF-080-5.45
SCH: 94033003
SF080050

Ms. Barbara W. Sahm, Environmental Review Officer
City and County of San Francisco
Department of City Planning
Office of Environmental Review
450 McAllister Street, 5th Floor
San Francisco, CA 94102

Re: **92.202E & 94.060E: Replacement Alternatives for the Embarcadero Freeway and the Terminal Separator Structure.**

Dear Ms. Sahm:

We wish to clarify a statement made in our letter dated March 16, 1994, in which we commented on the Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR)/Draft Environmental Impact Statement (DEIS) for the Replacement Alternatives for the Embarcadero Freeway and the Terminal Separator Structure.

Please delete comment #1, on page 1, in which ER funds and SB 181 are referenced. This issue is being resolved as stated in Caltrans letter of March 7, 1994, signed by Joe Browne, District Director. Our intention was not to reopen the funding issue as a current constraint for the DEIR/DEIS. We apologize for any inconvenience our wording may have caused and for creating any impression that Caltrans had changed its thinking regarding our desire to cooperate with the City of San Francisco. We are in no way motivated to delay progress on the resolution of meeting the transportation needs in this important area within San Francisco.

Should you have any questions regarding these comments, please contact Lynne March of my staff at (510) 286-5589.

Sincerely,

JOE BROWNE
District Director

by

BLESILDA H. GEBREYESUS
Senior Transportation Planner

cc: Mike Chiriatti, State Clearinghouse
Craig Goldblatt, MTC
Patricia Perry, ABAG

MTC
METROPOLITAN
TRANSPORTATION
COMMISSION

September 17, 1992

OFFICE OF
ENVIRONMENTAL REVIEW

Barbara Sahm
Environmental Review Officer
Department of City Planning
450 McAllister St.
San Francisco, CA 94102

Subject: **Comments on the NOP for the Mid-Embarcadero Roadway Replacement Project**

Dear Ms. Sahm:

MTC staff has reviewed the NOP and project scoping materials for the Mid-Embarcadero Roadway Replacement Project. MTC is a Responsible Agency under CEQA and looks forward to reviewing the draft EIR. MTC will use the EIR as the basis for its project review, and its approval of grant applications for state and federal funds for this project. The project should be submitted to MTC for review and approval once the final environmental document is completed.

MTC's comments on the NOP address four areas: freeway connectivity; urban design issues; transit/pedestrian/bicycle access; and air quality. We also have some comments on the proposed funding plans for the alternatives.

Freeway Connectivity

MTC believes that the freeway connections are a vital component of the project and warrant careful consideration from an operational and funding standpoint. Demolition of the Embarcadero Freeway has impacted traffic patterns throughout the City; these impacts need to be quantified and included in a traffic analysis in the EIR. The land transfer and the federal ER funds are contingent on a facility that provides "motorists with accessibility comparable to that provided by Route 480." We encourage staff to continue to work closely with Caltrans and FHWA so that policy decisions on the Embarcadero Roadway will not jeopardize federal and state emergency funding.

Urban Design Issues

The demolition of the Embarcadero Freeway has provided the City an opportunity to create a model design incorporating transportation, urban design and land use components. We are encouraged to note that the City is considering a number of alternatives, including a subsurface connection to Washington Street.

The recently passed federal Intermodal Surface Transportation and Efficiency Act (ISTEA) requires a closer relationship between transportation projects and related factors, including land use conservation and the like. MTC must consider these broader factors in its review of the project.

Alameda County
Edward R. Campbell
David S. Karp

Contra Costa County
Robert I. Schroder
Steve Weir
Chair

Marin County
Karen Kunze

Napa County
Fred Negri

San Francisco-City and County
Harry G. Britt
Rubin Glickman

San Mateo County
Tom Nolan
Jane Baker
Vice-Chair

Santa Clara County
Rod Diridon
James T. Beall, Jr.

Solano County
James Spering

Sonoma County
Peter C. Foppiano

Association of Bay Area Governments
Dianne McKenna

S.F. Bay Conservation and Development Commission
Angelo J. Siracusa

State Business, Transportation and Housing Agency
Preston W. Kelley

U.S. Department of Transportation
William P. Duplissea

U.S. Department of Housing and Urban Development
Gordon H. McKay

Executive Director
Lawrence D. Dahms

Deputy Executive Director
William F. Hein

Joseph P. Bort MetroCenter • 101 Eighth Street • Oakland, CA 94607-4700
510/464-7700 • TDD/TTY 510/464-7769 • FAX 510/464-7848

Transit/Bicycle/Pedestrian Access

Transit, pedestrian and bicycle access for the surface alternative needs to be carefully examined. The proposed wide medians and portals may inhibit pedestrian and bicycle access. Traffic signals and crosswalks should be designed for easy access to the LRT, ferries and the waterfront. Roadway shoulders need to be designed wide enough to provide a safe and direct thoroughfare for bicyclists; otherwise, a separate bikeway should be studied (ISTEA enhancement funding may be available for design, pedestrian and bicycle elements of this project).

Air Quality

This project will be subject to MTC's project review and air quality analysis (MTC Resolution 2270) procedures before construction funds can be awarded. Resolution 2270 includes procedures for assessing the conformity of individual transportation projects to the region's Transportation Improvement Program (TIP). Project sponsors of major federally-funded projects are required to conduct a carbon monoxide (CO) analysis to show that the project will eliminate or reduce the severity and number of federal 8-hour CO violations in the area substantially effected by the project. Projects that do not conform to this criterion will be considered by MTC for delay.

Staff will be happy to assist project staff and consultants in addressing the requirements of MTC Resolution 2270.

Funding

It is our understanding that the project has committed revenues totalling $99 million as follows:

	$ 5.6 M	- Sales Tax
	9.4 M	- 90 STIP
	15.0 M	- 92 STIP
	58.0 M	- Federal ER funds
	11.0 M	- State ER Funds
Total	$99.0 M	

We understand that the City has also identified about $15 million from the sale of excess right of way and $35 million in ISTEA or STIP funds (ISTEA or STIP funds are not committed at this time), bringing total anticipated revenues to $149 million.

Project costs range from $ 80 million to $300 million. It appears, therefore, that Alternatives A-C are the only fundable alternatives. A substantial amount of new unidentified revenue sources will be needed to fund the higher-cost alternatives. We would be happy to work with the City on funding options for this project.

Thank you for the opportunity to comment on the NOP. Our staff is available to assist you through the environmental process in any way we can. If you have any questions regarding our comments, please call Doug Kimsey of the MTC staff at (510) 464-7794.

Sincerely,

William F. Hein
Deputy Executive Director

cc: Emilio Cruz, S.F. Waterfront Projects
Commissioner Britt
Commissioner Glickman

MTC
METROPOLITAN
TRANSPORTATION
COMMISSION

Alameda County
Edward R. Campbell
E. William Withrow

Contra Costa County
Tom Powers
Sharon J. Brown

Marin County
Doug Wilson

Napa County
Fred Negri

San Francisco-City and County
Tom Hsieh
Rubin Glickman

San Mateo County
Mary Griffin
Jane Baker
Chairwoman

Santa Clara County
Rod Diridon
James T. Beall, Jr.

Solano County
James Spering

Sonoma County
Peter C. Foppiano

Association of Bay Area Governments
Dianne McKenna
Vice-Chair

S.F. Bay Conservation and Development Commission
Angelo J. Siracusa

State Business, Transportation and Housing Agency
Joe Browne

U.S. Department of Transportation
William P. Dupuissea

U.S. Department of Housing and Urban Development
Gordon H. McKay

Executive Director
Lawrence D. Dahms

Deputy Executive Director
William F. Hein

March 9, 1994

City & County of S.F.
Dept. of City Planning
MAR 11 1994
OFFICE OF
ENVIRONMENTAL REVIEW

Barbara W. Sahm
Environmental Review Officer
Department of City Planning
City and County of San Francisco
450 McAllister Street
San Francisco, CA 94102

Subject: NOP of EIS/EIR for Replacement Alternatives for the Embarcadero Freeway and Terminal Separator Structure

Dear Ms. Sahm:

MTC staff has reviewed the NOP and project scoping materials for the above referenced project. The City had begun preparation of an EIS/EIR for the Mid-Embarcadero Roadway project. That project has now been expanded to include evaluation of alternatives to the Terminal Separator Structure.

MTC had commented on the NOP for the Mid-Embarcadero Roadway EIS/EIR (attached). These comments would generally still pertain to the combined project EIS/EIR.

Although direct freeway access between the Mid-Embarcadero Roadway segment and the freeway is not being considered, careful consideration needs to be given to ramp design so that mainline freeway operations are not negatively impacted.

Thank you for the opportunity to comment on the NOP. If we can be of any assistance in development of the EIS/EIR, please do not hesitate to contact us.

Sincerely,

Doug Kimsey

Doug Kimsey
Planner/Analyst

Joseph P. Bort MetroCenter • 101 Eighth Street • Oakland, CA 94607-4700
510/464-7700 • TDD/TTY 510/464-7769 • FAX 510/464-7848

PORT OF SAN FRANCISCO

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San Francisco, CA 94111
Telephone 415 274 0400
Telex 275940 PSF UR
Fax 415 274 0528
Cable SFPORTCOMM
Writer

September 21, 1992

Ms. Barbara Sahm
Environmental Officer
City and County of San Francisco
Department of City Planning
450 McAllister, 6th Floor
San Francisco, CA 94102

RE: Transmittal of Port Commission Resolution and Request for Inclusion of Concerns/Impacts in EIR/EIS for the Central Embarcadero Roadway Replacement Project.

Dear Barbara,

The Port Commission (on September 9th) unanimously adopted the attached Port Staff report on Issues/Concerns regarding the Central Embarcadero Roadway Replacement Project. The Port Commission requested that I transmit the report to you so that the issues/concerns can be addressed in the EIR/EIS for Central Embarcadero Roadway Replacement Project.

In a similar fashion, I am transmitting the Port's resolution and issue paper to Rudy Nothenberg, the CAO, for consideration and resolution in a series of amendments to the Memorandum of Understanding adopted by the Port Commission and other City Departments on the Waterfront Transportation Projects.

The Port Staff looks forward to working with your staff, Sarah Pickus and Parsons Bickerhoff in an effective and comprehensive resolution of Port concerns in the EIR/EIS. We expect that, by working together, we will be able to resolve the Port's concerns in a manner that should not jeopardize or slow down the completion of the Roadway Project.

Please contact either myself or Joe Wyman (274-0352) at your earliest convenience so that we can discuss how best to address the concerns of the Port Commission.

Sincerely,

for JF Conrad
Michael P. Huerta
Executive Director

CC: Emilio Cruz, CAO
Rebecca Kolhstrand, DCP
Sharon Rogers, DCP

Enclosure: Port Commission Resolution and Issues regarding the Central Embarcadero Roadway Replacement Project

City and County of San Francisco
Port of San Francisco
Resolution # 92 - 87

AUTHORIZING THE EXECUTIVE DIRECTOR OF THE PORT OF SAN FRANCISCO TO PRESENT THE PORT COMMISSION'S CONCERNS TO THE CITY'S ENVIRONMENTAL REVIEW OFFICER FOR CONSIDERATION IN THE ENVIRONMENTAL IMPACT REPORT OF THE MID-EMBARCADERO ROADWAY REPLACEMENT PROJECT AND TO NEGOTIATE WITH THE CITY'S CHIEF ADMINISTRATIVE OFFICER TO MODIFY TO THE EXISTING MEMORANDUM OF UNDERSTANDING BETWEEN THE PORT COMMISSION AND VARIOUS CITY DEPARTMENTS TO ADDRESS THE CONCERNS ENUMERATED IN THE POSITION PAPER.

WHEREAS, the Mayor of San Francisco has instructed the Chief Administrative Officer (CAO) to proceed with a replacement roadway, for the demolished Embarcadero Freeway, located in part on Port property (the "Roadway Replacement Project");

WHEREAS, the CAO has proposed five conceptual Roadway Replacement Project alternatives to be analyzed in an Environmental Impact Report and has asked the Port Commission to submit comments on the proposed scope of the EIR;

WHEREAS, all the potential Roadway Replacement Project alternatives have varying degrees of impact on the Port of San Francisco and its tenants;

WHEREAS, the Port Commission entered into a Memorandum of Understanding with the CAO and other city departments over resolution of potential impacts of the Waterfront Transportation Projects, and this MOU does not address all potential impacts on the Port of the alternatives proposed for the Roadway Replacement Project;

WHEREAS, the Port Commission has reviewed and endorses the Port's Position Paper entitled, "Port of San Francisco Concerns over the Mid- Embarcadero Roadway Replacement Project", which addresses the potential impacts of the roadway alternatives on Port and Tenant Interests;

NOW THEREFORE BE IT RESOLVED, that the Port Commission does hereby authorize the Executive Director of the Port, or his representatives, to present this Position Paper on the Port Commission's behalf, to the City 's Environmental Review Officer for examination in the EIR for the Roadway Replacement Project.

AND BE IT FURTHER RESOLVED, that the Port Commission does hereby authorize the Executive Director to present the Position Paper to the CAO and to negotiate modifications to the existing Waterfront Transportation Project MOU between the Port and various City Departments in order to address the concerns enumerated in the Position Paper.

I HEREBY CERTIFY that this resolution was adopted by the San Francisco Port Commission at its meeting of September 9, 1992.

Secretary

CITY AND COUNTY OF SAN FRANCISCO
SAN FRANCISCO PORT COMMISSION

AGENDA SUMMARY SHEET

Meeting Date: 9/9/92

Agenda Item: 7A
Resolution No. 92-87

SUBJECT: Review and Comment on Proposed Roadway Design Alternatives for the Mid-Embarcadero Roadway Replacement Project.

Submitted by: Anne Cook, Acting Manager
Planning and Development

AGENDA CLASSIFICATION

___ Executive Director's Report
___ Finance & Administration
___ Commercial Property
___ Maritime
___ Engineering & Maintenance
_X_ Planning & Development
___ Legal
___ Other

BACKGROUND

The Chief Administrative Officer (CAO) has scheduled a "scoping session" under the California Environmental Quality Control Act (CEQA) for the mid-Embarcadero Roadway Replacement Project (the "Roadway Project") **September 14, 1992** (455 **Golden Gate, Rm 1194, at 12:00 and again at 5:30 PM**). The scoping session is designed to give the public (including the Port Commission and its tenants) an opportunity to comment on the scope of the proposed environmental study (in this case an Environmental Impact Report -- EIR) and on roadway design alternatives which have been identified for the Roadway Project. In a similar fashion, all responsible agencies (those agencies such as the Port that will have to issue some type of permit or approval for the Roadway Project) have been sent a notice of preparation for the EIR asking for comments on the scope and content of the EIR.

The EIR will evaluate the environmental impacts of five conceptual roadway designs described in Attachment 1.

Review and Comment on Proposed Roadway Design Alternatives for the Mid Embarcadero Roadway Replacement Project.

Port Staff has been participating on the Technical Advisory Committee and Policy Steering Committee (TAC and PSC, respectively) for the Waterfront Transportation Projects, including the Roadway Project. On numerous occasions staff has raised the concerns presented in the attached position paper (Attachment 2). Solutions to the Port's concerns have not been suggested by the TAC or the PSC making it very difficult for the Port staff to determine the extent of any negative impacts on the Port or its tenants.

As you may recall, in 1990, the Port Commission entered into a Memorandum of Understanding (MOU) with various City Departments regarding the implementation of the Waterfront Transportation Projects. A portion of the MOU dealt with the loss of parking spaces along the central Embarcadero, outlining a study process to address the parking space loss and identifying the MUNI Bus/Trolley turn-around facility as a potential parking relocation site. The terms of the MOU were negotiated prior to demolition of the Embarcadero Freeway and included a tacit understanding that any replacement parking facility would be provided by other city departments (as a mitigation measure) and that these City Departments would work on an agreement that would dedicate the new spaces in the replacement facility to the future renovation of the Ferry Building and other structures in the area.

To date, the Department of Parking and Traffic (DPT) has prepared a brief analysis of the financing constraints of building a replacement parking structure. The analysis indicates that most parking garages built by the City need an initial financial subsidy to underwrite the construction and start-up of operations. DPT concluded that because a garage could not generate revenue, their responsibilities under the MOU were completed. There has been no further research regarding the garage or replacement parking issue since that analysis was completed.

In the meantime, several of the original assumptions behind the MOU have changed -- the Embarcadero Freeway has been demolished and MUNI has initially rejected the idea of a parking structure on the turn-around facility. ROMA, the urban design consultant to the City Planning Department, has suggested the idea of placing a one story, underground parking structure (approximately 300 -325 parking spaces) under the block bounded by Drumm, Clay, Justin Herman Plaza, and the Embarcadero.

The attached Position Paper expresses the Port staff's concerns regarding impacts on the Port and its tenants from the reconstruction of the Roadway. The concerns arose from the conceptual roadway designs presented by the CAO (Waterfront Transportation Projects Office), the Department of City Planning and its design consultants (ROMA and Korve Engineering), and from the lack of progress made on the provisions regarding parking included in the MOU. In addition, several concerns in the paper have been raised by Port tenants or their representatives. You will also find a series of recommendations for the EIR consultants and the City's Environmental Officer (shown in Italics).

Review and Comment on Proposed Roadway Design Alternatives for the Mid-Embarcadero Roadway Replacement Project.

RECOMMENDED ACTION.

1. Adopt attached resolution authorizing the Executive Director to present the position paper to the City's Environmental Review Officer for evaluation in the Environmental Impact Report.

2. Authorize the Executive Director to negotiate with the City's Chief Administrative Officer to modify the existing Memorandum of Understanding between the Port Commission and various City Departments to address the concerns in the implementation of the Roadway Project.

Executive Director's recommendation:	Commission Action Required:	Commission Action Taken:
	___ Motion	Date:
✓ Approved	X Resolution	
___ Disapproved	___ Ordinance	Continued:
	___ Information Only	

SECRETARY

Port of San Francisco Concerns over the Mid- Embarcadero Roadway Replacement Project.

September 1, 1992

The following analysis was prepared by Port of San Francisco Staff based on analysis of a series of proposed design alternatives for the replacement of the central portion of the Embarcadero Roadway (the Mid-Embarcadero Roadway Replacement Project). The Mid-Embarcadero Roadway Replacement Project is the third phase of the City's Waterfront Transportation Projects, a series of transportation and urban design Projects along the Embarcadero being managed by the CAO.

In order to secure a substantial portion of funding from FHWA and Caltrans, the new design must adequately serve the same level of traffic as the now demolished, elevated Embarcadero Freeway.

The proposed roadway designs (and related plaza configuration for civic space at the foot of Market Street) have been developed by ROMA Design and Korve Engineers under contract with the Department of City Planning. A Citizens Advisory Committee (CAC) has also participated in design development, proposing several additional roadway design alternatives for inclusion in the EIR that will be prepared for the Project.

I. Loss of Short and Long term Parking Spaces in Port Jurisdiction.

The proposed Project alternatives assume removal of all parking spaces (both short and long term) in the area bounded by Folsom Street (on the south), Broadway (on the north), the eastern right of way line of the Embarcadero (on the east) and the western right-of-way line (on the west) in the right-of-way of the Embarcadero (the "Study Area"). Replacement curb-side parking has been proposed in the Study Area but would be limited to non-commute hours and could be further restrained by required BCDC amendments to the Waterfront Transportation Projects permit for the Embarcadero as well as by limitations placed on the Mid-Embarcadero Roadway Replacement Project during further design development by the CAC and the Department of City Planning.

The Roadway Replacement Project alternatives presented to date have not been of sufficient detail to ascertain their precise impact on parking in the Study Area. Nevertheless, preliminary conclusions can be reached regarding the probable elimination of parking spaces based on earlier studies by DCP and the CAO's Waterfront Transportation Office that inventoried parking spaces in the Study Area.

Port of San Francisco Concerns over the Mid- Embarcadero Roadway Replacement Project.
September 1, 1992

The following discussion draws from those studies and shows the potential elimination under the proposed Roadway Replacement Project alternatives.

Total # of Parking Spaces Lost from Replacement Project

Loss of Off-Street Parking Spaces	430
Loss of Off-Street Parking Spaces directly in front of Ferry Building	79
Loss of On-Street Parking Spaces	263
TOTAL	772
Estimate of replacement parking spaces (Curb side, non-commute hour parking only)	200
% Decrease in Parking supply	80%

Potential Impact of Lost Parking Spaces

> Loss of parking spaces may undermine long term viability/reuse options for Port properties.

A certain number of parking spaces (both long and short term) need to be maintained to ensure the long range goals of renovating the Ferry Building, Agriculture Building, Piers 1, 1 1/2, 3 and 5, and to allow for the possibility of new land use activity generators in the re-designed plaza area. Without a sufficient parking supply, re-use of the structures and development will be more difficult and, in many respects, may be improbable.

The Department of City Planning Parking Study (1989) indicated that there was a total development potential of 4.8 million square feet for Piers 38 - 35, of which only approximately 2.3 million square feet was then developed and occupied. The study concluded that the development potential of the Port properties will be decreased significantly if parking were incorporated into each Project (a concept not supported by BCDC).

> Loss of spaces in the Mid-Embarcadero is aggravated by the policies of BCDC's Total Design Plan (TDP), Special Area Plan (SAP), and the City's Planning Code.

BCDC's TDP and SAP both call for the elimination of all parking spaces not related to uses permitted by each plan and the elimination of all parking over the water. For example, the TDP indicates that there were approximately 1075 spaces in the mid-Embarcadero area (1975) and calls for the elimination of 950 of these spaces. The only parking alternatives offered in the TDP and SAP are "viable upland locations" outside of BCDC's jurisdiction and the interim use of Pier 1 for parking.

The up-land locations in the mid-Embarcadero area are in the jurisdiction of the City Planning Commission and are governed by the Downtown Plan and the Planning Code, both of which discourage the construction of parking garages and advocate the general policies of "transit first" and "auto free" areas. Construction of a replacement parking facility would require a conditional use permit from the Planning Commission. In light of aesthetic concerns with respect to the area, a replacement structure probably would have to be located underground, making the financial feasibility of an up-land garage improbable.

> Loss of parking spaces means a loss of annual revenue to the Port.

The deletion of parking spaces in front of the Ferry Building will mean the loss of approximately $550,000 to 600,000 annually to the Port of San Francisco.

The EIR's analysis of ***"social, economic, and relocation effects" and "transportation effects"****, should study the impact of the number of parking spaces being eliminated in the Study Area, examine possible alternative locations for replacement parking facilities, and recommend a method to mitigate parking loss by securing replacement parking facilities for affected Port properties. The EIR also should examine the potential ramifications of land use changes on the parking supply in the Study Area and ascertain whether the goals of the Citizens Advisory Committee can be met with the existing parking facilities. The EIR also should examine the difference between the lost parking spaces and proposed replacement facilities and ascertain revenue impacts to the Port. Other parking management measures should be evaluated by the EIR to determine the best solution to the parking problem created by the Project.*

II. Vehicular access to the Ferry Building, surrounding properties and other areas of Port jurisdiction, including Fisherman's Wharf.

With respect to each of the proposed roadway alternatives, a significant amount of Port tenant concern has been expressed regarding 1) how southbound traffic will access the Ferry Building area and 2) whether the roadway alternatives will restrict traffic access and capacity into the Fisherman's Wharf area.

In the transportation analysis of the EIR, a comparative analysis of how much additional time would be required and inconvenience would be caused for traffic to access the Ferry Building and surrounding restaurants and clubs should be conducted and the ***land use, traffic and social, economic and relocation impacts*** *of such changes in accessibility should be analyzed. In addition, the EIR should examine vehicular access into the Wharf area via the Embarcadero and ascertain which alternatives degrade or enhance access into the Wharf and other Port properties. This analysis should quantify potential revenue loss or gain to Port tenants and should analyze any land use and social, economic and relocation impacts of changed traffic flows.*

III. Movement of Goods along the Embarcadero.

Freight and truck service to the working piers and to Port tenants along the waterfront primarily occurs via the Embarcadero roadway. Current access between the Embarcadero and the piers is fairly uninhibited due to the lack of a median and frequent curb cuts. The EIR prepared for the I-280 Transfer Concept Program indicated that current levels of truck traffic on the Bay Bridge bound for the waterfront will double in the near future, necessitating the maintenance of continued access to avoid disruption of Port activities. Moreover, that EIR indicated that future Projects would have further impacts on vehicular movements along the Embarcadero. In particular, the reconstruction of the Pier 45 fish handling facilities and planned development of a new commercial fishing harbor at Fisherman's Wharf will increase the demand for vehicular access along the Embarcadero into the Wharf.

As discussed above, the proposed roadway designs all have varying degrees of impact on vehicular access along the Roadway. In particular, in those alternatives where local and freeway access are combined (in a southbound movement) freight movement to the southern piers from the north will be impaired during the PM rush hour due to queuing for the Bay Bridge on the surface lanes of the Embarcadero. In a similar manner, in those alternatives where freeway bound traffic is placed in a tunnel and on queuing ramps, an adequately sized local access road must provide both access to the Ferry Building complex and some through-put capacity for freight movements to the south, in order to solve freight movement constraints during the PM peak.

The Port also is concerned that multiple pedestrian and F-line traffic crossings of the Embarcadero will interfere with freight movement along the Embarcadero.

The EIR should analyze impacts of the proposed alternatives on the movements of trucks and goods along the Embarcadero and the potential ***land use, transportation and economic impacts*** *of any delay that may occur as result of the Project . The land use assumptions used in the development of traffic Projections should take into account both planned Port Projects (Pier 45, Harbor construction, etc..) and the ramifications of the Waterfront Land Use planning effort now underway. The transportation analysis also should evaluate how the roadway will operate during off-commute periods to ensure adequate operational capacities for the Port's maritime operations.*

IV. Vehicular and Service Vehicle Access to Port properties.

Given the level of design detail of the alternatives, how vehicular access to each Pier and tenant operation will be maintained cannot be determined with any level of accuracy at this time. In the TAC and CAC discussions, vehicular drop off points in front of the Ferry Building have been the only suggested solution. Similarly, drive way cuts on Port property have not been shown on any of the designs . Without further details, "local access" can not be accurately evaluated.

The EIR should evaluate each of the proposed roadway alternatives to determine which of the alternatives would provide a similar level of service access as currently exists for each Port property and tenant operation in the Study Area. In those alternatives where access is impeded, the EIR should make recommendations in the mitigation section to ensure that local access can be maintained. Local access should also be examined for the land use goals of the CAC. The transportation analysis also should evaluate how the roadway will operate during off-commute periods to insure adequate operational capacities for the Port's maritime operations.

V. Loss of Sea Wall Lot 351.

All the design alternatives envision demolition of the gas station on Sea Wall Lot 351. The demolition of the station will have negative land use and revenue impacts on the Port. The tenant has both a lease and license with the Port which generates $35,000 to 40,000 a year. In addition the property has a land value to the Port and is seen as a key site being located on a corner of a major thoroughfare and in close proximity to both the waterfront and the downtown area. For many years, the gas station site has also been proposed as a potential location for meeting the parking needs of the Ferry Building and other properties in the Study Area. If the tennis court/swimming pool site of the Golden Gateway complex were ever developed, then the Port property could be offered as additional development area for the Golden Gateway Project.

*The EIR should examine the **land use, economic and relocation impacts** of the demolition of the gas station on the Port and indicate mitigation measures for any negative impacts on the Port and its tenants.*

VI. Impact on the long range renovation plans for the Ferry Building.

Throughout the design process, there have been a series of assumptions made about particular roadway alternatives and the respective impact on the potential long range use of the Ferry Building. For example, the portals necessary to submerge the roadway in front of the Ferry Building (Alternatives 3, 4 and Vernon DeMars alternative) would have to be in excess of 100 feet in length . The noise and visual impacts of the portals have been portrayed as a negative impact on the Ferry Building. As a result, the surface roadway alternatives (2 and partially 3) appear to have the least design impact on the Ferry Building.

On several occasions, the Port Commission has endorsed the design parameters/goals developed by Charles Page & Associates (Union Depot & Ferry House, San Francisco: Design Guidelines for Restoration and Adaptive Use of the Ferry Building, July 1978). In general, the roadway alternatives to be examined in the EIR should address the recommendations of the Page study (pp. 79 -88, Site Guidelines).

The EIR should evaluate each of the design alternatives against the site guidelines specified in the Page study to ascertain which of the roadway alternatives best achieves the goals of that study. The impact of increased/decreased vehicular movements around the Ferry Building and its environs should be analyzed (i.e.; impact of noise levels on tenant spaces, pollution and roadway emissions effects on the facade and building material, etc.). In addition, the Ferry Building, the Agriculture Building, and Piers 1, 1 1/2, 3 and 5 are either National Register properties or are eligible for the Register. The proposed design alternatives should be evaluated for their potential impact on the historic structures.

VII. Assumptions concerning land uses on Port property as well as surrounding districts should be coordinated with the Port's Waterfront Planning efforts

For Port property, the Project managers of the EIR process should work closely with Port Staff to develop land use context assumptions that do not preclude land use or development options that may be identified in the Port's ongoing Waterfront Plan process.

Information concerning the Waterfront Planning process is attached for background information. The planning process is being overseen by the Waterfront Plan Advisory Board, a 27 member citizen group appointed by the Mayor, the Port Commission, and the Board of Supervisors. The Waterfront Advisory Board will provide the Port Commission with recommendations concerning the adoption and implementation of the comprehensive Waterfront Plan.

The EIR should look at the parameters of the waterfront planning efforts of the Port to ensure that particular land use options that are under consideration are not rendered infeasible by the roadway alternatives. In addition, the EIR transportation element should incorporate various land use scenarios being developed as part of the Proposition H / Waterfront planning process and adequate roadway capacity should be ensured for the range of land use scenarios. The transportation analysis also should evaluate how the roadway will operate during off-commute periods to ensure adequate operational capacities for the Port's maritime operations.

VIII. Division of Roadway Project from Plaza Project could jeopardize Mitigation Measures for Roadway Project Impacts.

The CAO has only recently proposed limiting the analysis in the EIR to the Roadway Replacement Project rather than including both the roadway and plaza designs in the EIR. Despite this change in direction, the Plaza Project has not been assigned to a particular City Department for management, nor has a definitive project scope been ascertained. Moreover, given the probable impacts of loss of parking and impeding local access on Port properties generated by the Roadway Replacement Project, replacement facilities or other mitigation measures may be recommended in one EIR that fall in the Plaza Project Study Area or elsewhere, and subject to yet another study and EIR process.

The Port is concerned that, absent the identification of a lead agency for the Plaza Project and evidence of an ability to implement it, our concerns regarding issues such as parking, access and replacement Projects will not be resolved in the Roadway Replacement EIR and simply deferred to another uncertain study process.

City and County of San Francisco **Recreation and Park Department**

September 30, 1992

Barbara Sahm
Environmental Review Officer
Department of City Planning
450 McAllister Street
San Francisco, CA 94102

RE: 92.202E: Mid-Embarcadero Roadway Replacement Project

Dear Ms. Sahm:

Thank you for this opportunity to comment on the scope and content of the upcoming EIR/EIS for the proposed project. As you know, the replacement project alternatives currently being considered are adjacent to, or cross through, property under the jurisdiction of the Recreation and Park Commission. Therefore, the potential impacts to public open space could be quite substantial.

1. Project Description:

The project description as stated in the Notice of Preparation is narrowly defined as being the replacement of the roadway. Based on information currently on file with the City Planning Department, the project consultant and other City departments, the proposed development of the mid-Embarcadero as a major civic space that encompasses open space, transit, a civic plaza and recreation and event activities is reasonably foreseeable. Therefore, it seems inappropriate to narrowly define the project for purposes of environmental review as a roadway replacement project.

More than a year ago, the Citizens Advisory Committee for the Embarcadero Project (CACEP) was formed by the Department of City Planning in cooperation with the Mayor's Office. In a report published by the CACEP in 1991, several objectives related to urban design were stated. In addition, the report stated that the CACEP had been meeting monthly to "guide the evolution of this important area...." and to "...define a long-range plan for this section of the waterfront."

In September 1991, the City Planning Department circulated a Request for Qualifications (RFQ) for the Embarcadero Pedestrian Project. According to the RFQ, "...the planning effort is to create an urban open space in front of the Ferry Building which will be a grand pedestrian plaza and civic focal point....to establish the use of other spaces within the study area in a manner which will enhance pedestrian use and public enjoyment." The RFQ identified urban design (including landscape architecture) as a major component of the planning project.

McLaren Lodge, Golden Gate Park
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San Francisco 94117

Since the award of that contract nearly a year ago, the project consultant, working with city staff and meeting regularly with the CACEP, has created a large body of information (including planning documents and a model) related to the future development of this area as a major civic space.

Clearly, all of the proposed roadway alternatives potentially could significantly impact open space. The potential impacts of the proposed project range from the most basic land use considerations (such as the configuration of the future and/or resulting open space) to the very complicated impacts related to noise, visual impacts, traffic, pedestrian access, transit and urban design.

But more importantly, the project as developed by City staff and the project consultant, and as presented to the CACEP, the general public and the press has always been described as having an urban design component, and in fact, the project has been presented as the renewal of the mid-Embarcadero into a great civic space.

Under CEQA and NEPA, therefore, it is difficult to understand how an EIR/EIS that narrowly defines the project as the replacement of a roadway can be deemed adequate when it fails to address the reasonably foreseeable impacts associated with a major future phase of the proposed project related to open space and urban design.

At a minimum, the project should be described in the EIR/EIS as a multi-phased project. Existing conditions, potential impacts and proposed mitigation measures for all elements of each phase, including open space, should be included. For example, the potential impacts of the proposed roadway on existing open space should be evaluated as Phase One of the proposed project, and mitigation measures related to a limited redesign to integrate the proposed roadway with existing open space should be included. The EIR/EIS should also address open space improvements related to a long-range, urban redesign for a major civic open space as Phase Two of the proposed project.

2. Evaluation of future open space should include the following:

   - Existing and proposed uses and activities that may take place on park and open space sites should be reviewed. These include, but are not limited to, a major gathering or assembly area for rallies, pageants, races, noontime and weekend presentations and musical events, cafe activity, promenade, and quiet seating and landscaped areas set off from the large, hard surface group activity areas. Some uses, such as camping and skateboard use, should be discouraged. Street artist vending is not permitted on park property.

- Uses contemplated for property that is now, or may become designated park land, must be acceptable recreational uses. These future uses should also clearly serve the park and open space needs of San Francisco's diverse communities. An inventory or assessment of existing recreational facilities in the area, including private facilities, is recommended in order to determine the recreational needs of the immediate community.

- The F-Line should be routed around major open spaces to minimize potential adverse impacts to park property.

- Sunlight access, views, wind, and sound/noise impacts should be analyzed.

- Construction impacts in general and impacts on current uses should be examined and appropriate mitigation measures developed.

- Bicycle circulation and parking (including issues related to safety issues) should be analyzed and incorporated into the alternatives.

- Disabled access must be incorporated into the urban design plan.

- Structures adjacent to open spaces should be at a human scale consistent with the anticipated open space pedestrian activities.

- Pedestrian circulation should be maximized within the open space and to the waterfront/Ferry building.

- The Vaillancourt Fountain, if retained, should be modified to relate to the new surrounding open space in its design and proportions. Whether the fountain is removed, or modified and retained, the procedural and legal issues related to civic art should be reviewed.

3. Potential Economic Impacts

It is my understanding that under federal environmental review, potential economic impacts are evaluated. Maintenance of existing and proposed open space is a critical economic concern. The potential economic impacts related to the improvement, operation and maintenance of existing and proposed open space as affected by the proposed project should be evaluated. Mitigation measures should be devised to assure adequate funding for the maintenance of future parks and open spaces along the Embarcadero.

Currently, the day to day maintenance of Justin Herman Plaza is done by the Embarcadero Center under an agreement with the Recreation and Park Department. Whatever configuration the open space might have in the future, the economic impact to the City stemming from its agreement with the Embarcadero Center should be evaluated and appropriate mitigation measures should be proposed to insure its continuation.

Various funding alternatives should be explored for developement and/or maintenance of open space:

- Use of Downtown park funds may become available for improvements along the Embarcadero if Rincon Point Park funds are reimbursed.
- An assessment district should be considered as a possible funding mechanism.
- Revenue-generating uses (such as a subsurface parking facility with a surface park use) that would fund development and/or maintenance of parks and open spaces should be examined.
- A bond measure might also be considered as a possible funding mechanism.
- Capital funding should be structured so that a portion of the funds would be set aside as a maintenance endowment, as is being done by the Department of Public Works in structuring State highway funding.

4. Identification of Jurisdiction/Approval Procedures

Analysis of the project alternatives should include illustrations that clearly identify the various property jurisdictions. It would also be helpful to identify the size and acreage of the various properties.

The legal issues and procedures required for the possible disposition of existing properties (particularly with respect to any proposal involving a replacement roadway occupying property under the jurisdiction of the Recreation and Park Commission) must be delineated. Property exchanges of designated park land with Caltrans, the Port, private or other property under City jurisdiction which might be contained within the project area, or possibly outside of the immediate area, should be included in the review.

The legal review should also define the approval authority and process required for all aspects of the project as well as the transfer of property. The parameters and approval process of the "4F" review should also be detailed.

5. Engineering

The alternatives currently being discussed are at a "pre-engineered" stage. Thus, it can be expected that major changes may take place between these alternatives and those that might be included in the EIR/EIS or the preferred alternative that ultimately will be implemented.

It is highly desirable that alternatives reviewed in the EIR/EIS have as much engineering factored into their design as possible since EIR/EIS alternatives must be representative of the ultimate project alternative. In any case, the EIR/EIS alternatives should present the worst case scenario so that adequate mitigations can be devised.

Thank you again for this opportunity to comment on the proposed EIR/EIS for the mid-Embarcadero project. Recreation and Park Department staff look forward to working with OER staff as the EIR/EIS progresses. In the meantime, please contact Joanne Wilson (666-7130) or Deborah Learner (666-7087) if you need further information.

Sincerely,

Phil W. Arnold
Assistant General Manager
for Administration

c: Hilary Gitelman, OER
Rebecca Kohlstrand, DCP
Emilio Cruz, CAO
Sarah Pickus, DPW
Joanne Wilson, R/P

MEB/JCW:0071d

SAN FRANCISCO MUNICIPAL RAILWAY 949 PRESIDIO AVENUE, SAN FRANCISCO, CALIF 94115 415-673-6864

MEMORANDUM

To: Barbara Sahm, DCP-OER

From: Peter Straus, Director of Service Planning

Subject: TSS/Mid-Embarcadero EIS/EIR Scoping

Date: March 18, 1994

These comments address both the TSS Traffic Study and the EIS/EIR, since the Traffic Analysis is a component of the complete environmental analysis, and any deficiencies of the former need to be addressed by the latter. We would like to emphasize that we remain fully in support of the City's decision to delete Alternatives 5 and 6 from further consideration on the basis of the traffic analyses completed to date. We do, however, believe the additional items summarized below, all of which have been discussed previously among city staff, must be included in the environmental analyses in order to refine and select among the alternatives which remain:

1) The consultant should complete the traffic study that was started to guide the city's decision on the preferred alternatives.

2) The EIS/EIR needs to contain a more complete incident analysis, since the frequency of incidents affecting the operation of the system is so high, and specifically address transit operations.

3) The traffic model needs to better replicate the transit operational conditions that have existed since the 1989 earthquake, especially on 1st Street and Fremont, as compared to pre-earthquake conditions. Approaches to doing so were discussed at staff meetings with the consultants, but, to date, this has not been done.

4) The traffic model needs to be run with the transit mitigation measures in place.

5) Additional transit mitigation measures need to be looked at for 1st Street and Fremont.

I apologize for our tardiness in getting this memo to you and its brevity. Please call me at 923-6100 if you have any questions. Thanks.

cc: H Gitelman, DCP
B Wycko, DCP
JB Stein
K Gilbert
P Straus
R Niewiarowski
D Watry (2)
SP Chron

PUBLIC UTILITIES COMMISSION CITY AND COUNTY OF SAN FRANCISCO

TOTAL P.03

SAN FRANCISCO
DPT
DEPARTMENT OF PARKING & TRAFFIC

FRANK M. JORDAN, Mayor
JOHN E. NEWLIN, Executive Director

City & County of S.F.
Dept. of City Planning

MAR 14 1994

OFFICE OF
ENVIRONMENTAL REVIEW

February 28, 1994

Hillary Gitelman
Office of Environmental Review
Department of City Planning
450 McAllister Street
San Francisco, CA 94102

Dear Ms. Gitelman:

This letter recommends a change in the description of alternatives for the Terminal Separator Structure and the Embarcadero Freeway.

Alternatives 2, 3, and 4, as described, state that "The Embarcadero, between Folsom Street and Howard Street, would be realigned to conform with the South Embarcadero alignment." This suggests that there would be two lanes each direction in this block. We would like this changed to two lanes plus a parking/towaway lane for each direction.

We understand that there is no physical space limitation to adding a third lane northbound at this location. And we feel that an additional lane is desirable since Folsom will likely become a major access point to The Embarcadero. The Folsom Street traffic, when added to the South Embarcadero traffic, will likely require an additional lane of traffic.

Note that this recommendation does not preclude the possibility of narrowing or bulbing the north crosswalk at Folsom Street to reduce pedestrian crossing time. This possibility should be evaluated in the design stage of the project.

Therefore, we recommend a change in the description of all alternatives to include two lanes plus towaway northbound between Folsom and Howard Streets on The Embarcadero.

Sincerely,

John E Newlin

John E. Newlin
Executive Director

cc: Emilio Cruz
Waterfront Transportation Projects
Office of the Chief Administrative Officer
Room 289 City Hall

(415) 554-PARK FAX (415) 554-9834 25 Van Ness Ave., Suite 410 San Francisco, CA 94102-4576

STATE OF CALIFORNIA — THE RESOURCES AGENCY

PETE WILSON, Governor

OFFICE OF HISTORIC PRESERVATION

DEPARTMENT OF PARKS AND RECREATION

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August 14, 1995

FHWA950427A

Fred J. Hempel, Division Administrator
Federal Highway Administration
Region Nine, California Division
980 9th Street, Suite 400
SACRAMENTO CA 95814-2724

Re: Mid-Embarcadero/Terminal Separator Project, San Francisco, San Francisco County.

Dear Mr. Hempel:

On August 10, 1995 a meeting was held in San Francisco between representatives of City of San Francisco Planning Department, the San Francisco Landmarks Preservation Advisory Board, California Department of Transportation (Caltrans)-District 4, San Francisco Redevelopment Agency, Patrick McGrew, Historic Architect and Consultant, and the State Office of Historic Preservation (SHPO) to clarify disagreements over determinations of eligibility for nine (9) properties located within the Area of Potential Effect (APE) for the Mid-Embarcadero/Terminal Separator project, San Francisco, San Francisco County.

As stated in our June 29, 1995 letter, the disagreements were prompted by determination eligibility conclusions reached in the Historic Property Survey Report (HPSR) submitted for the project. In accordance with Section 106 of the National Historic Preservation Act, the August 10 meeting participants have determined, with SHPO concurrence, that the following eligibility determinations are valid:

Structures that are individually eligible for inclusion on the National Register of Historic Preservation (NRHP)

- 20 California Street, Criterion C
- 64 Clementina Street, Criterion C
- 443-447 Folsom Street, Criterion A
- Street Light Standards, Market Street, Criterion A and C

- o 231 First Street, Criterion A
- o 246 First Street, Criterion A and C
- o 347-49 Fremont Street, Criterion C

All of these structures have either strong associations with historic events or are architecturally significant representations of a type or style of construction associated with a historic era.

Two structures that were determined eligible in the HPSR do not meet the age criteria of 50 years or older for inclusion on the NRHP. These structures are:

- o 450 Harrison Street
- o 926 Harrison Street

Although both structures have interesting architectural qualities, they are not of exceptional significance as defined in Criteria Consideration G of National Register Bulletin 15 (National Park Service, 1991). It is suggested that these structures be resubmitted for review for inclusion on the NRHP once they reach 50 years of age.

The meeting participants also agreed that the following structures might become eligible for inclusion on the NRHP pending the submission of further research documentation on past alterations or changes to their original fabric:

- o 17-21 Drumm Street
- o 23-29 Drumm Street
- o 31 Drumm Street
- o 35 Drumm Street
- o 301 Folsom Street

We are also awaiting further information on the Sterling/Harrison/Rincon Streets (Switch Station), for possible inclusion on the NRHP as a contributor to the historic San Francisco Bay Bridge.

Meeting participants also concurred that all other properties evaluated in the HPSR that were not previously evaluated in earlier historic property survey reports are not eligible for inclusion on the NRHP under any of the criteria established by 36 CFR 60.4. None of these structures have strong associations with the historic events or persons, nor are they architecturally significant.

You are also seeking the comments of the SHPO on your determination of the effects the proposed alternatives will have on historic resources in accordance with 36 CFR 800.5. Our review of the information contained in the HPSR and Evaluation of Effects (EOF) documentation leads us to concur with your determination that none of the project alternatives, as described, will have an effect on historic resources located within or near the project APE. The mitigation measures suggested on Page 66 of the EOF will be adequate to minimize the effects of noise, particulate emissions, and other atmospheric effects generated by the operation of construction equipment on historic buildings. In addition, we are pleased to note that Section 7.2 of the EOF documentation contains a commitment to halt all project activities in the event that significant prehistoric or historic archeological resources are uncovered, or if human remains are unearthed during construction.

Thank you again for seeking our comments on your project. If you have any questions, please contact staff historian Clarence Caesar at (916) 653-8902.

Sincerely,

Cherilyn Widell
State Historic Preservation Officer

Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

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APPENDIX A

FUNDING SOURCES FOR ALTERNATIVES

APPENDIX A: ESTIMATED COSTS & PROPOSED FUNDING SOURCES FOR EACH ALTERNATIVE

Alternative One: **No Build Alternative**

Estimated Cost: $ 0[1]

Alternative Two: **Mid-Embarcadero Roadway**

Mid-Embarcadero Roadway

Estimated Cost -- Embarcadero Portion:	$ 57 Million
Estimated Cost -- TSS Portion:	5 Million
Total Estimated Cost:	$ 62 Million[2]

Federal ER -- Embarcadero Portion:	$ 2	Million
Federal ER -- TSS Portion:	3	Million
State ER -- Embarcadero Portion	9.7	Million
State (STIP)	19.3	Million
Other State -- TSS Portion:	.2	Million
Mayor's (Local) ER	.5	Million
Local Sales Tax Revenue	5.6	Million
Land Sale[3]	.2	Million
Total Identified Funding:	$40.5	Million[4]

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[1] Does not include costs associated with demolition of the Embarcadero Freeway or costs incurred on environmental/preliminary engineering, etc. (about $16 Million). Also does not include costs of realigning the northbound Embarcadero Roadway between Folsom and Howard Streets, which would have to be achieved as a separate project.

[2] Estimates by Don Todd Associates 3/24/95 & San Francisco's CAO Waterfront Transportation Projects Office. Estimates are preliminary and do not include construction of parking structure or other right-of-way costs ($25 to 35 Million).

[3] Projected net proceeds from sale of land parcels transferred from Caltrans to the City in 1994 per SB 181 (Kopp, 1991). Assumes sale proceeds would not be available for design or construction of this alternative.

[4] Assumes no State or Federal Emergency Relief (ER) funding would be available for design or construction of this alternative. $10 Million of State Transportation Improvement Program (STIP) funding may not be available until after year 2000.

APPENDIX A: ESTIMATED COSTS & PROPOSED FUNDING SOURCES FOR EACH ALTERNATIVE

Alternative Three: Mid-Embarcadero Roadway and Peninsula Access Ramps -- Second Street Option

Estimated Cost -- Embarcadero Portion:	$ 62 Million
Estimated Cost -- TSS Portion:	40 Million
Total Estimated Cost:	$102 Million[1]

Federal ER -- Embarcadero Portion:	$40.9	Million
Federal ER -- TSS Portion:	31.8	Million
State ER -- Embarcadero Portion	9.7	Million
State (STIP)[2]	5.7	Million
Other State -- TSS Portion:	6.8	Million
Mayor's (Local) ER	.5	Million
Local Sales Tax Revenue	1.0	Million
Land Sale[3]	5.2	Million
Total Identified Funding:	$102	Million

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[1] Estimates by Don Todd Associates 3/24/95 & San Francisco's CAO Waterfront Transportation Projects Office. Estimates are preliminary and do not include construction of parking structure or other right-of-way costs ($25 to 35 Million).

[2] Assumes up to $9 Million in STIP funding would be available for the Embarcadero portion of the project.

[3] Projected net proceeds from sale of land parcels transferred from Caltrans to the City in 1994 per SB 181 (Kopp, 1991).

APPENDIX A: ESTIMATED COSTS & PROPOSED FUNDING SOURCES FOR EACH ALTERNATIVE

Alternative Three: Mid-Embarcadero Roadway and Peninsula Access Ramps -- Fourth Street Option

Estimated Cost -- Embarcadero Portion:	$ 63 Million
Estimated Cost -- TSS Portion:	38 Million
Total Estimated Cost:	$101 Million[1]

Federal ER -- Embarcadero Portion:	$41.6	Million
Federal ER -- TSS Portion:	30.7	Million
State ER -- Embarcadero Portion	9.7	Million
State (STIP)[2]	5.7	Million
Other State -- TSS Portion	6.6	Million
Mayor's (Local) ER	.5	Million
Local Sales Tax Revenue	1.0	Million
Land Sale[3]	5.2	Million
Total Identified Funding:	$101	Million

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[1] Estimates by Don Todd Associates 3/24/95 & San Francisco's CAO Waterfront Transportation Projects Office. Estimates are preliminary and do not include construction of parking structure or other right-of-way costs ($25 to 35 Million).

[2] Assumes up to $9 Million in STIP funding would be available for the Embarcadero portion of the project.

[3] Projected net proceeds from sale of land parcels transferred from Caltrans to the City in 1994 per SB 181 (Kopp, 1991).

APPENDIX A: ESTIMATED COSTS & PROPOSED FUNDING SOURCES FOR EACH ALTERNATIVE

Alternative Four: Mid-Embarcadero Roadway with Traffic Modifications

Estimated Cost -- Embarcadero Portion:	$ 57 Million
Estimated Cost -- TSS Portion:	11 Million
Total Estimated Cost:	$ 68 Million[1]

Federal ER -- Embarcadero Portion:	$2.2	Million
Federal ER -- TSS Portion:	2.5	Million
State ER -- Embarcadero Portion	9.7	Million
State (STIP)	19.3	Million
Other State -- TSS Portion	.2	Million
Mayor's (Local) ER	.5	Million
Local Sales Tax Revenue	5.6	Million
Land Sale[2]	.2	Million
Total Identified Funding:	$40.2	Million[3]

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[1] Estimates by Don Todd Associates 3/24/95 & San Francisco's CAO Waterfront Transportation Projects Office. Estimates are preliminary and do not include construction of parking structure or other right-of-way costs ($25 to 35 Million)

[2] Projected net proceeds from sale of land parcels transferred from Caltrans to the City in 1994 per SB 181 (Kopp, 1991). Assumes sale proceeds would not be available for design or construction of this alternative.

[3] Assumes no State or Federal Emergency Relief (ER) funding would be available for design or construction of this alternative. $10 Million of State Transportation Improvement Program (STIP) funding may not be available until after year 2000.

APPENDIX A: ESTIMATED COSTS & PROPOSED FUNDING SOURCES FOR EACH ALTERNATIVE

Alternative Five: Curved Mid-Embarcadero Roadway and New Peninsula Access Ramps -- Second St. Option

Estimated Cost -- Embarcadero Portion:	$ 63 Million
Estimated Cost -- TSS Portion:	40 Million
Total Estimated Cost:	$103 Million[1]

Federal ER -- Embarcadero Portion:	$41.8	Million
Federal ER -- TSS Portion:	31.8	Million
State ER -- Embarcadero Portion	9.7	Million
State (STIP)[2]	5.7	Million
Other State -- TSS Portion	6.8	Million
Mayor's (Local) ER	.5	Million
Local Sales Tax Revenue	1.0	Million
Land Sale[3]	5.3	Million
Total Identified Funding:	$103	Million

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[1] Estimates by Don Todd Associates 3/24/95 & San Francisco's CAP Waterfront Transportation Projects Office. Estimates are preliminary and do not include construction of parking structure or other right-of-way costs ($25-35 Million)

[2] Assumes up to $9 Million in STIP funding would be available for the Embarcadero portion of the project.

[3] Projected net proceeds from sale of land parcels transferred from Caltrans to the City in 1994 per SB 181 (Kopp, 1991).

APPENDIX A: ESTIMATED COSTS & PROPOSED FUNDING SOURCES FOR EACH ALTERNATIVE

Alternative Five: Curved Mid-Embarcadero Roadway and New Peninsula Access Ramps -- Fourth St. Option

Estimated Cost -- Embarcadero Portion:	$ 64 Million
Estimated Cost -- TSS Portion:	38 Million
Total Estimated Cost:	$102 Million[1]

Federal ER -- Embarcadero Portion:	$42.4	Million
Federal ER -- TSS Portion:	30.7	Million
State ER -- Embarcadero Portion	9.7	Million
State (STIP)[2]	5.7	Million
Other State -- TSS Portion	6.6	Million
Mayor's (Local) ER	.5	Million
Local Sales Tax Revenue	1.0	Million
Land Sale[3]	5.4	Million
Total Identified Funding:	$102	Million

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[1] Estimates by Don Todd Associates 3/24/95 & San Francisco's CAO Waterfront Transportation Projects Office. Estimates are preliminary and do not include construction of parking structure or other right-of-way costs ($25 to 35 Million).

[2] Assumes up to $9 Million in STIP funding would be available for the Embarcadero portion of the project.

[3] Projected net proceeds from sale of land parcels transferred from Caltrans to the City in 1994 per SB 181 (Kopp, 1991).

APPENDIX B

FISHERMAN'S WHARF SALES TRENDS

City and County of San Francisco

SAN FRANCISCO PORT COMMISSION

AGENDA SUMMARY SHEET

Subject: Fisherman's Wharf Sales Trends

Meeting Date: November 22, 1993
Agenda Item No.: 5E
Res. No.:

Submitted By: Kirk Bennett
Manager, Fisherman's Wharf

AGENDA CLASSIFICATION

____	Executive Director's Report	Engineering & Maintenance	____
____	Finance & Administration	Planning & Research	____
X	Commercial Property	Legal	____
____	Maritime	Other	____

The attached tables and graph present the sales trends for Fisherman's Wharf during the past nine fiscal years. In the first table, which indicates sales in terms of current dollars, the sales trends are obscured by the effect of inflation on the value of the dollar. The second table indicates these trends in constant 1984/1985 dollars, which presents the true sales trends after adjusting for inflation. The graph likewise presents the sales trends in constant dollars.

The sales shown reflect only the sales of the Port tenants with percentage rental leases. In the case of Pier 39, the sales represent the revenues received by the partnership owning Pier 39, which reflects the rental income received from subtenants, not the actual sales of the subtenants.

(Continued on following page.)

RECOMMENDATION:

This is presented for informational purposes only.

EXECUTIVE DIRECTOR'S RECOMMENDATION	COMMISSION ACTION REQUIRED	COMM. ACTION TAKEN
	___ Motion	Date. . . . .
	___ Resolution	Approved ________
	___ Ordinance	Disapproved ________
	X Information Only	Continued ________

____
SECRETARY

The Sales Trends

During the period of Fiscal Year 1984/1985 through Fiscal Year 1988/1989 (prior to the October, 1989 earthquake), the real growth in sales averaged 1/2% per year. (Although sales declined somewhat between 1987/1988 and 1988/1989, this primarily resulted from the discontinuation of helicopter service.) Between 1988/1989 and 1989/1990 (the fiscal year in which the earthquake occurred), the total sales declined 10%, and those for restaurants dropped 11%. In contrast, total eating and drinking sales for San Francisco, also in constant dollars, decreased only 1% between 1988 and 1989 and by 2% between 1989 and 1990. (This Citywide sales trend was reported in a study prepared by Ernest & Associates, which prepared their analysis based on calendar years.) It is noteworthy that this sharp drop in sales occurred between 1988/1989 and 1989/1990, while the recession was not recognized until August, 1990, after the end of the 1989/1990.

Sales for Fisherman's Wharf, in terms of constant dollars, have not recovered since 1989/1990. Total sales have remained flat, and the sales for the restaurants at Fisherman's Wharf have continued to decline at a rate of 2% per year, which is consistent with the City as a whole.

The fundamental sales trend for Fisherman's Wharf during the past nine years was thus consistent sales growth until the October 1989 earthquake, after which sales dropped sharply and have remained at that plateau ever since. In constant 1984/1985 dollars, this represents a loss in sales of approximately $6 Million per year, or in current dollars, almost $8 Million per year. The impact on Port revenues has approximated $500,000 per year in lost percentage rent. The percentage rent that the Port has lost since the earthquake has thus totaled about $2 Million. Without any change, this loss of $500,000 per year will continue.

Why Sales Declined

There are four fundamental types of visitors to Fisherman's Wharf:

1. San Francisco residents
2. Regional visitors from the Greater Bay Area
3. National tourists
4. International tourists

Since the earthquake, national and international tourists have continued to visit San Francisco, and the vast majority have included Fisherman's Wharf as a part of their trip. There was, however, a sharp drop in the number of regional visitors to Fisherman's Wharf after the earthquake. In addition, visits to Fisherman's Wharf by San Francisco residents were declining before the earthquake, and this decline appears to have continued, for reasons unrelated to the earthquake.

For regional visitors, the freeway system before the earthquake provided clear, well-defined paths to Fisherman's Wharf from throughout the Greater Bay Area. After the earthquake, the Embarcadero Freeway and much of the Central Freeway were lost, and ten freeway ramps serving Northeast San Francisco were eliminated. The result was increased travel times and confusion about routes. Many regional visitors just stopped coming to San Francisco and to Fisherman's Wharf.

The San Francisco Bay Area Household Survey, conducted by the San Francisco Economic Development Corporation in 1990, found a net 10% decrease in metropolitan area consumers patronizing San Francisco, and for the East Bay, there was a 14% net decline. This study attributed this dramatic drop in metropolitan patronage of San Francisco to the increased difficulties in driving into the City. It concluded that:

> "The increased difficulty in driving into the City not only discouraged people from making the trip, it also provided the incentive to find local alternatives to San Francisco business, shopping, and recreation opportunities. Although most consumers returned to the City, they incorporated local alternatives into their behavior patterns--and San Francisco experienced a permanent shift in metropolitan area patronage."

Why this shift occurred is suggested by the results of the Citywide Travel Behavior Survey conducted in 1992 by the San Francisco Planning Department, which included residents of San Francisco and the Greater Bay Area. It discovered that for home-based trips, the majority of visits to Northeast San Francisco were by automobile. For restaurants, 75% of such trips were by automobile. In making a decision to visit Fisherman's Wharf, its accessibility by automobile is thus a very critical consideration to prospective visitors.

Mr. S. Dale Hess, the Executive Vice President for the San Francisco Convention and Visitors Bureau, has observed that several trends discouraging visits to San Francisco by regional visitors were already in motion at the time of the earthquake. These included the development of new retail, eating and recreational opportunities in the suburbs, and the changing needs of babyboomers, who were marrying and seeking family entertainment at a lower cost closer to home. The impact of the earthquake on the freeway system accelerated and amplified the affect of these trends.

For San Francisco residents, Fisherman's Wharf has lost much of its authenticity and attractiveness. As for the Greater Bay Area, new retail, eating and recreational opportunities have been developed within the City, competing for the attention and patronage of San Francisco residents, as well as regional visitors. The latest of these is Yerba Buena Gardens.

Required Initiatives

This loss of regional and local visitors does not need to be permanent, nor should it be. While national and international tourism to San Francisco has remained strong, these market segments are vulnerable to potentially dramatic declines due to many possible factors. Moreover, measures taken to increase visits to Fisherman's Wharf by San Francisco residents and by regional visitors will also make it more attractive to national and international tourists.

The revenues received by the Port from Fisherman's Wharf are very sensitive to changes in sales. A 1% change in aggregate sales produces approximately a $50,000 change in total percentage rents. Initiatives in the following four areas are therefore required to attract regional visitors and San Francisco residents back to Fisherman's Wharf, and to thus maximize the Port's revenues from Fisherman's Wharf. Initiatives are already underway in each of these areas.

1. Revitalization of the Fishing Industry - The fishing industry is the heart of Fisherman's Wharf. Its vitality is essential to the continued economic health of other businesses at the Wharf. Revitalization of the fishing industry is thus crucial for preserving and enhancing the appeal of Fisherman's Wharf. Toward this end, work is underway on the Pier 45

earthquake repairs and on the design of modern fish handing facilities in Sheds B and D of Pier 45. In addition, a study of Sheds A and C for a potential Fisheries Institute is currently in process. Finally, background work is being completed for an EIR regarding the proposed Hyde Street Fishing Harbor Project, which would provide a basis for seeking additional funding for this project.

2. Creating a Strong Attraction - Regional visitors and San Francisco residents must be drawn back to Fisherman's Wharf. This requires the creation of strong attractions that get their attention, capture their interest, and satisfy their desire for authenticity. Toward this end, a program is being created to establish and promote a changing display of interesting, unique military and historic ships on the outer end of the East Apron of Pier 45. Such a program would be very appealing to regional and San Francisco residents and would provide promotional opportunities to attract these residents to Fisherman's Wharf. The pulling power of such a program is evidenced by the fact that the biggest week for restaurant sales at Fisherman's Wharf is Fleet Week, which primarily attracts San Francisco residents and regional visitors. It is further evidenced by the success achieved by the Baltimore Inner Harbor in attracting such visitors through a promotional program built around an on-going, continually-changing display of historic ships. To implement this program at Fisherman's Wharf, major repairs are needed to the fender system on the East Apron on Pier 45, and a capital funding request for these repairs has been approved.

   A public market hall would also constitute a very strong attraction for regional visitors and even more so for San Francisco residents. Such operations represent the fundamental attractions of Pike Place Market in Seattle and of Granville Island in Vancouver, B.C. Preliminary discussions have been held with existing long term leaseholders at Fisherman's Wharf regarding the possibility of developing such an operation.

   Finally, the fundamental attraction of Fisherman's Wharf is still the fishing industry, and this attraction would be increased by making the fishing industry more accessible and visible to visitors. This would be accomplished by making public access improvements, such as at Pier 47A; by installing directional and interpretative signage; by providing tours, perhaps in conjunction with the proposed Fisheries Institute; and by encouraging tenant improvements, such as the fish receiving station recently developed by Scoma's.

3. Experience Enhancement - Capital improvements are needed to improve the experience of regional and local visitors to Fisherman's Wharf, encouraging them to return on a regular basis. The following capital improvement projects are being initiated: funding has been secured for the rehabilitation of Pier 47A, upgrading its transient mooring facilities and enhancing its public accessibility; Pier 43 will be restored and improved for public access as a part of the Pier 39 Aquarium Project; and planning has begun on improvements to the central Fisherman's Wharf triangle.

   Improved operations and maintenance are also important to enhance the experience of visitors. Some such improvements have already been made using Port staff and also with the cooperative efforts of the Fisherman's Wharf Restaurant Association and the Fisherman's Wharf Port Tenants Association.

4. Improvements to Traffic Patterns - The construction of the North and South Embarcadero Segments of the Waterfront Transportation Project is in progress. Construction of the North Embarcadero Segment will include provision for the F-Line Extension, and design has begun on the further extension of the F-Line through Fisherman's Wharf. Pending the final resolution and construction of the Terminal Separator Structure and the Mid-Embarcadero Segment of the Waterfront Transportation Project, interim traffic measures are necessary to define the driving routes to Fisherman's Wharf, and these interim traffic measures are now being developed.

In summary, Fisherman's Wharf must be made more attractive and accessible to San Francisco residents and regional visitors. To draw them back, the fishing industry must be revitalized, strong attractions must be created, and the experience of visitors must be enhanced. Residents of the City and of the Greater Bay Area must perceive Fisherman's Wharf to be interesting, authentic, and enjoyable. In addition, the accessibility of Fisherman's Wharf, whether by public or private transportation, must be enhanced, and the accessibility of the fishing industry and other attractions within Fisherman's Wharf must be improved.

PORT OF SAN FRANCISCO
Fisherman's Wharf
Sales Trend
($000)

						Post-Earthquake			
Sales in CURRENT Dollars	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
Restaurants	$40,023	$42,617	$45,532	$46,673	$48,443	$45,265	$47,485	$47,380	$46,054
Pier 39 (1)	9,609	10,730	11,583	12,861	13,513	13,522	15,219	15,095	15,467
Other Tourist Oriented Businesses (2)	11,071	11,494	12,670	13,415	11,782	10,983	11,692	13,449	14,876
Total Sales	60,703	64,841	69,785	72,949	73,738	69,770	74,396	75,924	76,397

						Post-Earthquake			
Sales in CONSTANT Dollars (3)	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
Restaurants	$40,023	$41,057	$42,081	$41,598	$41,263	$36,861	$36,982	$35,984	$34,394
Pier 39 (1)	9,609	10,337	10,705	11,463	11,510	11,011	11,853	11,436	11,551
Other Tourist Oriented Businesses (2)	11,071	11,073	11,710	11,956	10,036 (4)	8,944	9,106	10,189	11,110
Total Sales	60,703	62,467	64,496	65,017	62,809	56,816	57,941	57,519	57,055

Source: Port of San Francisco; monthly sales receipts submitted to Port (and tabulated by Port).

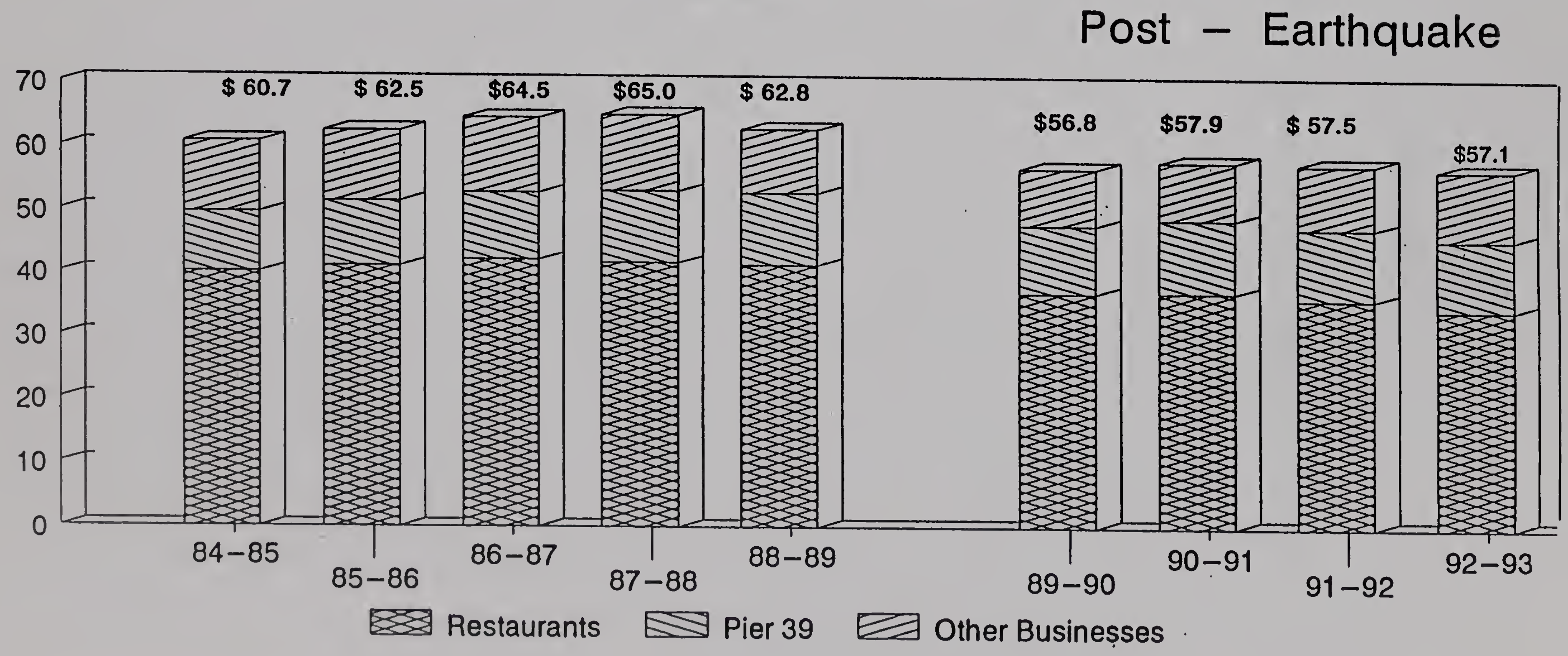
Footnotes:

(1) Sales reflect gross receipts of Pier 39 operations, but only gross rental income from sub-tenants, licensees and concessionaires
(2) Excursions (water and land), retail, parking and miscellaneous
(3) Source: US Department of Labor Statistics, Food Away From Home, 1984-85 equals 100
(4) Helicopter Service discontinued 1987-88 (1987-88 sales equaled $1.5 million)

PORT OF SAN FRANCISCO

Fisherman's Wharf

Sales Trend in Constant $
(millions)



Source: Port of San Francisco.

APPENDIX C

LEVEL OF SERVICE DESIGNATIONS

APPENDIX C

LEVEL OF SERVICE DESIGNATIONS

Existing and future traffic conditions at signalized intersections within the primary study area have been evaluated using the TRAF-NETSIM Traffic Simulation Model. Conditions at signalized intersections in the secondary study area have been evaluated using the *1985 Highway Capacity Manual* (*Transportation Research Board, 1985*) operations methodology. Both methodologies use the concept of Level of Service (LOS), which, for signalized intersections, is defined in terms of delay, or waiting time at a signal. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Intersection LOS, determined according to the vehicle delay in seconds per vehicle, range from LOS A (very low delay) to LOS F (forced flow). Table C-1 provides more detailed descriptions of the six LOS, A through F, for signalized intersections using the 1985 Highway Capacity Manual method. The TRAF-NETSIM Simulation calculates LOS in much the same way, with similar results, but refines the analysis based on signal progression along streets such as the Embarcadero, and based on spill-back, when queues from one intersection extend back to a previous intersection.

In the past, for planning applications the City of San Francisco has used a slightly different methodology than the TRAF-NETSIM or 1985 Highway Capacity Manual to analyze operations at signalized intersections. That method, known as the *Critical Lane Analysis (Transportation Research Circular Number 212, Transportation Research Board, 1980)*, determines the ratio of critical opposing traffic volumes to theoretical intersection capacity, yielding the volume-to-capacity (v/c) ratio. Intersection LOS, determined according to the value of the v/c ratio, range from LOS A (free flowing condition) to LOS F (severely congested conditions). Table C-2 provides more detailed descriptions of the six LOS, A through F, for signalized intersections using the Critical Lane Analysis methodology.

Although the two methodologies for calculating the LOS differ, there is usually a good correlation between the LOS calculated using either method of analysis. It is only when high levels of congestion occur that differences between the two methodologies may be more apparent. As an example, using the Highway Capacity Manual methodology an intersection may be operating at a LOS F, with poor traffic progression, many signal cycle failures and vehicle delays above 60 seconds per vehicle, however, the v/c ratio could be below one, which would mean a LOS E using the Critical Lane Analysis methodology. Conversely, using the highway capacity manual methodology, an intersection may be operating at LOS D, with an efficient signal progression handling large traffic volumes, however the V/C ratio could be above 0.9, which would mean a LOS E using the critical lane analysis methodology.

TABLE C-1
LEVEL OF SERVICE DEFINITIONS BASED ON VEHICLE DELAY SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	VEHICLE DELAY (sec./veh.)	DESCRIPTION
A	≤ 5.0	**Insignificant Delays:** No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication.
B	5.1 - 15.0	**Stable Operation/Minimal Delays:** An occasional approach phase is fully utilized. Many drivers begin to feel somewhat restricted within platoons of vehicles.
C	15.1 - 25.0	**Stable Operation/Acceptable Delays:** Major approach phases are fully utilized. Most drivers feel somewhat restricted.
D	25.1 - 40.0	**Approaching Unstable/Tolerable Delays:** Drivers may have to wait through more than one red signal indication. Queues may develop but dissipate rapidly, without excessive delays.
E	40.1 - 60.0	**Unstable Operations/Significant Delays:** Volumes at or near capacity. Vehicles may wait through several signal cycles. Long queues form upstream from intersection.
F	≥ 60.0	**Forced Flow/Excessive Delays:** Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Source: Highway Capacity Manual, Transportation Research Board, Special Report No. 209, Washington, D.C., 1985

TABLE C-2
LEVEL OF SERVICE DEFINITIONS BASED ON VOLUME-TO-CAPACITY RATIO SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	VOLUME-TO-CAPACITY (V/C) RATIO	TYPICAL TRAFFIC CONDITION
A	0.00 - 0.59	**Uncongested operations:** All queues clear in a single signal cycle.
B	0.60 - 0.69	**Very light congestion:** An occasional approach phase is fully utilized.
C	0.70 - 0.79	**Light congestion:** Occasional backups on critical approaches.
D	0.80 - 0.89	**Significant congestion on critical approaches, but intersection functional:** Cars are required to wait through more than one cycle during short peaks. No long-standing queues formed.
E	0.90 - 0.99	**Severe congestion with some long-standing queues on critical approaches:** Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es).
F	N.A.	**Total breakdown:** Stop-and-go operation.

Source: Transportation Research Board, Circular 212 Planning, January 1980.

TABLE C-3
LEVEL OF SERVICE CRITERIA FOR BASIC FREEWAY SECTIONS

LEVEL OF SERVICE	MAXIMUM DENSITY (PC/MI/LN)	MINIMUM SPEED (MPH)	MAX SERVICE FLOW RATE (PCPHPL)	MAXIMUM *v/c* RATIO
		FREE-FLOW SPEED = 70 MPH		
A	10.0	70.0	700	0.318/0.034
B	16.0	70.0	1,120	0.509/0.487
C	24.0	68.5	1,644	0.747/0.715
D	32.0	63.0	2,015	0.916/0.876
E	36.7/39.7	60.0/58.0	2,200/2,300	1.000
F	var	var	var	var
		FREE-FLOW SPEED = 65 MPH		
A	10.0	65.0	650	0.295/0.283
B	16.0	65.0	1,040	0.473/0.452
C	24.0	64.5	1,548	0.704/0.673
D	32.0	61.0	1,952	0.8870/0.849
E	39.7/43.4	56.0/53.0	2,200/2,300	1.000
F	var	var	var	var
		FREE-FLOW SPEED = 60 MPH		
A	10.0	60.0	600	0.272/0.251
B	16.0	60.0	960	0.436/0.417
C	24.0	60.5	1,440	0.655/0.626
D	32.0	57.0	1,824	0.829/0.793
E	41.5/46.0	53.0/50.0	2,200/2,300	1.000
F	var	var	var	var
		FREE-FLOW SPEED = 55 MPH		
A	10.0	55.0	550	0.250/0.239
B	16.0	55.0	880	0.400/0.383
C	24.0	55.5	1,320	0.600/0.574
D	32.0	54.8	1,760	0.800/0.765
E	44.0/47.9	50.0/48.0	2,200/2,300	1.000
F	var	var	var	var

Source: Highway Capacity Manual, Transportation Research Board, Special Report No. 209, Washington, DC, 1994.

APPENDIX D

MINUTES FOR THE MAJOR INVESTMENT STUDY (MIS) MEETING ON THE ALTERNATIVES TO REPLACEMENT OF THE MID-EMBARCADERO/TERMINAL SEPARATOR STRUCTURE

Office of
CHIEF ADMINISTRATIVE OFFICER
Room 289 City Hall, San Francisco, CA 94102
Telephone: 415-554-5780 Fax: 415-554-7122

Rudolf Nothenberg
Chief Administrative Officer

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DEPT. OF CITY PLANNING

WATERFRONT at WORK
Waterfront Transportation Projects

August 31, 1994

MEMORANDUM

TO: Distribution List
FROM: Rebecca L. Kohlstrand RK
SUBJECT: Minutes for the Major Investment Study (MIS) Meeting on the Alternatives to Replacement of the Mid-Embarcadero/Terminal Separator Structure

Attached are minutes for the August 24, 1994 MIS meeting for the Mid-Embarcadero/ Terminal Separator Structure project. Thank you for your interest and participation. If you have any questions, please contact me at (415)554-5786.

Distribution:

John Schultz, Bill Wong (FHWA)
Robert Hom (FTA)
Joanne Cullom, Tony Anziana, Maria Cresci, Paul Mehta, Arnold Lee, Ahmad Azimzadeh, Nancy Knofler (Caltrans)
Doug Kimsey, Rod McMillan (MTC)
Ron Niewiarowski (SF PTD/Muni)
Sharon Banks (AC Transit)
Howard Goode (SamTrans)
Allan Zahradnik, Eric Robinson (Golden Gate Transit)
Janice Gendreau (SFO)
Carolyn Horgan (Red & White Fleet)
Paul Bishop (Harbor Bay Maritime)
Ernest Sanchez (Alameda/Oakland Ferry Service)
Roger Murphy (Blue & Gold Fleet)
Bill Negron (Amtrak)
Cheri Sheets (City of Alameda)
Jennifer O'Connor (SF DPW)
Hillary Gitelman, Rana Ahmadi (SF Planning)
Emilio Cruz, Leonard Tom (SF WTP)
Joe Wyman (SF Port)

Office of
CHIEF ADMINISTRATIVE OFFICER
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Rudolf Nothenberg
Chief Administrative Officer

WATERFRONT *at* WORK
Waterfront Transportation Projects

AGENDA

TERMINAL SEPARATOR STRUCTURE/MID-EMBARCADERO REPLACEMENT PROJECT

DISCUSSION OF THE MAJOR METROPOLITAN TRANSPORTATION INVESTMENT STUDY REQUIREMENTS

San Francisco Ferry Building
Room 3100 (Port Commission Room)
August 24, 1994
2:00-4:00 P.M.

1. History and Status of the Mid-Embarcadero/TSS Replacement Project
2. Description of Project Alternatives and related transit improvements
3. Project response to Major Metropolitan Transportation Investment Study requirements

midem\misag

Office of
CHIEF ADMINISTRATIVE OFFICER
Room 289 City Hall, San Francisco, CA 94102
Telephone: 415-554-5780 Fax: 415-554-7122

Rudolf Nathenberg
Chief Administrative Officer

WATERFRONT at WORK
Waterfront Transportation Projects

MINUTES OF THE MIS MEETING MID-EMBARCADERO/TERMINAL SEPARATOR STRUCTURE (TSS) REPLACEMENT PROJECT

August 24, 1994

Attendees:

John Schultz, FHWA
Bill Wong, FHWA
Robert Hom, FTA
Tony Anziano, Caltrans
Ahmad Azimzadeh, Caltrans
Maria Cresci, Caltrans
Joanne Cullom, Caltrans
Paul Mehta, Caltrans
Doug Kimsey, MTC
Ernest Sanchez, Alameda/Oakland Ferry
Allan Zahradnik, GGBHTD
Rana Ahmadi, SF DCP
Hillary Gitelman, SF DCP
Jennifer O'Connor, SF DPW
Emilio Cruz, SF WTP
Rebecca Kohlstrand, SF WTP
Leonard Tom, SF WTP
Ron Niewiarowski, Muni

1. Rebecca Kohlstrand stated the meeting was being held in partial fulfillment of the MIS requirements. As a pipeline project, the Mid-Embarcadero/TSS has received a preliminary assessment from MTC's regional committee that it will be exempt from the MIS requirements. Lacking a final recommendation, the city chose to proceed with a meeting to provide information to interested operators and agencies on the project history and status.

   Ms. Kohlstrand presented a brief history of the Waterfront Transportation Projects and how the Mid-Embarcadero/Terminal Separator Structure project fit into the overall concept for the city's waterfront. Three key issues were emphasized:

   a) the Mid-Embarcadero project has a very long history of public participation dating back to the freeway revolt in the late 1950's,
   b) the concept for the Embarcadero improvements, as originally conceived in the Northeastern Waterfront Plan adopted in 1977, has always been multi-modal incorporating a landscaped boulevard with an exclusive transit right-of-way, a bicycle lane, and a pedestrian promenade along the waterfront.
   c) the 1989 Loma Prieta earthquake presented a new opportunity to complete a long-standing plan by removing the Embarcadero Freeway and to rationalize

the freeway access system in the South of Market area, making use of underutilized surface street capacity, providing increased flexibility for new regional transit proposals, and creating new land use opportunities.

2. Hillary Gitelman summarized the Alternatives currently under consideration in the environmental process. Scoping for the project was completed in March, 1994 and the city, working in conjunction with Caltrans and FHWA, is currently preparing technical studies for the EIR/EIS. A Draft EIR/EIS is expected to be released in July 1995, with the Final EIR/EIS expected in December 1995.

Alternative 1 - No Build

Assumes no improvements to the surface Embarcadero and no replacement of the TSS ramps. The F-Line, the Muni-Metro Turnback, and the Muni-Metro Extension are assumed to be completed. Rincon Park will be established through the realignment of the northbound Embarcadero roadway as a separate project.

Alternative 2 - Mid-Embarcadero Roadway

This alternative calls for the reconstruction of the Mid-Embarcadero surface roadway as a paired roadway between Folsom and Broadway to be consistent with the north and south Embarcadero projects. It also includes minor surface street traffic operational changes to improve traffic flows. The F-Line, the Muni-Metro Turnback, and the Muni-Metro Extension are assumed to be completed. Rincon Park will be established through the realignment of the northbound Embarcadero roadway as part of the project.

Alternative 3A - Mid-Embarcadero Roadway and New Peninsula Access Ramps

This alternative is the same as Alternative 2, but it also includes improved access to and from the Peninsula via I-80/Hwy 101. An off-ramp is proposed to touch down at Second Street between Harrison and Bryant and an on-ramp would be built at Harrison directly west of Essex Street. Essex Street would become a four-lane southbound street providing two access lanes to the new Harrison Street on-ramp and two lanes would become a PM peak HOV access to I-80 eastbound. Sterling Street would become a full access ramp serving the recent development in the South of Market and waterfront areas. The existing Fremont Street off-ramp from the Bay Bridge would be realigned to allow direct access to Folsom Street as well as Fremont Street. Davis Street between Clay and Washington Street would be reopened to facilitate traffic circulation.

Alternative 3B - Mid-Embarcadero Roadway and New Peninsula Access Ramps

This alternative is the same as Alternative 3A with the exception of the Second Street off-ramp. Instead the existing Fourth Street off-ramp and the mainline freeway between Sixth and Fourth Streets would be widened.

Alternative 4 - Mid-Embarcadero Roadway with Traffic Modifications

This alternative is identical to Alternatives 3A and 3B , except it would not include any new ramps to and from I-80/Hwy 101.

Alternative 5A - Curved Mid-Embarcadero Roadway with New Peninsula Access Ramps

This alternative is the same as Alternative 3A, except the Embarcadero northbound and southbound roadways, immediately in front of the Ferry Building, would be split to create a public plaza. This would create a slight incursion into Justin Herman Plaza.

Alternative 5B - Curved Mid-Embarcadero Roadway with New Peninsula Access Ramps

This alternative is the same as Alternative 3B, except the Embarcadero northbound and southbound roadways, immediately in front of the Ferry Building, would be split to create a public plaza. This would create a slight incursion into Justin Herman Plaza.

There were a series of alternatives that were considered and rejected throughout the process. These will be documented in the EIR/EIS and are summarized by category below.

Technical Issues - In considering replacement projects for the TSS, several alternatives were evaluated and rejected due to grade limitations for the ramp systems. Because of topographic constraints, it was impossible to meet grade requirements and keep all local streets operational.

Section 4(f) Issues - Many alternatives for the Mid-Embarcadero project encroached into Justin Herman Plaza introducing 4(f) conflicts and were rejected. Alternatives 5A and 5B will, however, be carried through the environmental process.

Urban Design Issues - The initial proposal for the Mid-Embarcadero called for undergrounding the north and south bound lanes to create a pedestrian plaza in front of the Ferry Building. It was determined that undergrounding of the southbound roadway introduced horizontal grade conflicts with the Muni Metro turnback project. Partial undergrounding (depressed northbound roadway) was ultimately dropped for technical problems relating to weaving patterns and urban design considerations associated with the creation of very long open cut areas to provide a relatively small pedestrian plaza area in front of the Ferry Building.

Land Use Issues - Many alternatives for freeway replacement were rejected because the city felt the transportation objectives of the project could be met with alternatives that involved significantly less structure than the previous freeways, thereby creating new land use opportunities.

3. Ms. Kohlstrand concluded the presentation with a summation of how the Mid-Embarcadero/TSS project meets the key objectives of the MIS requirements relating to cost-effectiveness, evaluation of a full range of alternatives, assessment of full costs and impacts of the alternatives, and providing an open and cooperative process. Minutes of the meeting will be prepared and distributed.

A question/answer and comment session ensued that is summarized below.

Why did other alternatives with 4(f) issues get rejected? (Bob Hom)
Most of the alternatives that encroached into Justin Herman Plaza evolved from an historical vision of a semi-circular formal treatment for the intersection of Market Street and The Embarcadero. Alternatives 5A and 5B incorporated that historical concept with a split roadway design. There were also some alternatives that proposed development of high rise buildings, as a financing mechanism for open space improvements, in the existing Justin Herman Plaza that were rejected.

Has a Notice of Intent (NOI) been prepared for the project? (Bob Hom)
A NOI and Notice to Proceed (NOP) were published for the first scoping meeting held in September 1992. A NOP was also published for the second scoping meeting held in February 1994, when the TSS project was combined with the Mid-Embarcadero project. The NOI has been held up pending the refinement of alternatives, but is expected to be published within the next two months. It is being coordinated with FHWA.

How is the 4(f) issue being addressed for Alternatives 5A and 5B? (Bob Hom)
The F-Line has a categorical exemption from CEQA and is not subject to NEPA as no federal funding is being used. The impacts on the open space associated with Alternatives 5A and 5B will be examined in the Mid-Embarcadero/TSS 4(f) report.

Caltrans thanked the city for their ongoing cooperation on the project and for the multi-modal approach taken. (Joanne Cullom)

Will a preferred alternative be selected in the Draft EIR/EIS and what criteria will be used for screening? (Allan Zahradnick)
No, a preferred alternative will be selected after publication of the Draft EIR/EIS and will be incorporated in the Final EIR/EIS. The selection will not be based on a set of specific criteria, but an assessment of the impacts as fully disclosed.

What are the geographic boundaries for the environmental study areas? (Allan

Zahradnick)
Primary and a secondary study areas have been defined to assess the project impacts. The primary study area boundaries are roughly Broadway on the north; Sansome, Market, and Sixth Streets on the west; Brannan Street on the south; and The Embarcadero on the east. The secondary study area extends to Townsend Street on the south and Taylor Street on the west. There is some variation in the study areas depending upon the impacts being assessed.

Will the environmental document look at the impact of traffic conditions on transit operations? Will pedestrian access to the downtown from the Ferry Building terminals be adequately accommodated? (Allan Zahradnick)
The ability for ferry passengers to access the downtown and connecting bus service is a concern. (Ernest Sanchez)
The EIR/EIS has considered impacts on transit operations, with the primary focus on Muni. Operational improvements have been incorporated into the project alternatives to minimize transit impacts on First, Fremont, and Battery Streets. The city will follow-up with regional transit operators to ensure their concerns are addressed. Special consideration will be given to the pedestrian crossings of The Embarcadero at the Ferry Building to accommodate the surges of passengers as they disembark from the ferries.

Muni noted that they had participated throughout the process and that transit, including the F-Line, the Muni Metro Turnback and Extension, and the expansion of the bus terminal were being accommodated. They encouraged moving ahead with the project without delay. (Ron Niewiarowski)

Will FHWA require replacement of original freeway connections and how is this being addressed? (Doug Kimsey)
The federal Emergency Relief legislation and SB 181 called for comparable facilities or access. The analysis is taking a systems approach to assist the federal, state, and local agencies in making the determination on comparability. Ramp capacity, impacts on the mainline freeway, and surface street operations are all being assessed.

What is the basis for the land use and travel projections? (Allan Zahradnick)
The future projections are based upon the ABAG land use assumptions and the MTC travel assumptions for Year 2010. Refinements have been made to more accurately reflect the conditions particular to downtown San Francisco and to project forward to a Year 2015 analysis year.

FHWA thanked the city for their cooperation. (Bill Wong)

How does the F-Line fit into the overall construction schedule? (Bob Hom)
The F-Line construction is being coordinated with the construction of the roadway. The city is working with FHWA to determine if the mid-section of the F-Line project and the roadway can be accelerated to complete the improvements to The Embarcadero.

GLOSSARY OF ACRONYMS

AAQS	Ambient Air Quality Standards
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACHP	Advisory Council on Historic Preservation
ADA	American Disabilities Act
APE	Area of Potential Effects
ASR	Archaeological Survey Report
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BARTD	Bay Area Rapid Transit District
BCDC	Bay Conservation and Development Commission
BERM	Bureau of Environmental Regulation and Management
CAAA	Clean Air Act Amendments
CAAQS	California Ambient Air Quality Standards
CACEP	Citizens Advisory Committee for the Embarcadero Project
CAP	Clean Air Plan
CARB	California Air Resources Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
DPW	Department of Public Works
DSM	Deep Soil Mixing
DTSC	Department of Toxic Substance Control
EC	Electrical Conductivity
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
HASR	Historic Architecture Survey Report
HPSR	Historic Property Survey Report
IES	Illuminating Engineering Society
LOS	Level of Service
MCE	Maximum Credible Earthquake
MOA	Memorandum of Agreement
MMX	MUNI Metro Extension
MTC	Metropolitan Transportation Commission
MUNI	San Francisco Municipal Railway
NAAQS	National Ambient Air Quality Standards
NHPA	National Historic Preservation Act
NO_2	Nitrogen Dioxide
0_3	Ozone
OSHA	Occupational Safety and Health Administration
PM_{10}	Particulates
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SFDPH	San Francisco Department of Public Health
SFFD	San Francisco Fire Department
SFUSD	San Francisco Unified School District
SHPO	State Historic Preservation Office
SIP	State Implementation Plan

SMP	Site Mitigation Plan
SO_2	Sulfur Dioxide
SR	State Route
SWEL	Shallow Water Effluent Limitations
SWPP	Storm Water Pollution Prevention Plan
TIP	Transportation Improvement Program
TDR	Transferable Development Rights
TSS	Terminal Separator Structure
UMB	Unreinforced Masonry Buildings
WWD	Wastewater Discharge Requirements
MIS	Major Investment Study

GLOSSARY

Ambient Noise - Prevailing general noise existing in the surrounding area; in the case of this study, noise in the areas adjacent to the project alignment.

Brackish - qualitative measure salinity in water indicating a dissolved salts concentration which is higher than fresh water but lower than sea water.

Core barrels - metal cylinders with teeth used to cut through wood, concrete, rock. Typically, they are attached to some augering device, and are designed to retain a sample of the material penetrated.

dBA - A measure of "noisiness" as perceived by the human ear. dBA is based on the decibel system, the traditional measure of noise level. Many public agencies, including the EPA and Caltrans, require the use of this measure in noise impact evaluations.

Deep soil mixing - uses large diameter (up to 36 inches) flight augers to mix soil in place with stabilizing agents such as cement to increase soil strength and reduce soil permeability.

Densification - the rearranging of a given mass of soil particles to occupy a smaller volume.

Detention Structures - constructed features, such as basins or ponds, designed to temporarily collect runoff transporting sediments.

Dewatering - a construction practice which evacuates groundwater, through pumping or drainage, from an excavation or structure to prevent flooding or development of adverse pore water pressures.

Downdrag - forces on a pile shaft results from the settlement of soil around the pile shaft.

Effluent - wastewater or other fluids discharged from a collection or treatment process.

Electrical Conductivity - a measure of an induced electrical field which demonstrates the ability of a material to conduct electricity. In solutions, the electrical conductivity generally increases with the concentration of dissolved solids.

Erosion - a group of processes which act to loosen, dissolve, or transport rocks, sediment, and soil from one location to another.

Filtration - a wastewater treatment process in which water is passed through filter or system of filters designed to remove particulate contaminants.

Five-Year Storm Event - a rainstorm with a twenty percent ("one in five") probability of occurring.

Gravity Separation - a wastewater treatment process which allows for water to be collected and for the settlement of suspended solids which are separately treated or disposed of.

Groundwater Level - the measured level of groundwater (usually within a well) which represents the potentiometric surface (total head) of the groundwater. In an unconfined aquifer (such as at the project site), the groundwater level in a well is the groundwater table.

Ground waviness - a mode of ground failure where a series of peaks and troughs appear in the ground surface giving the appearance of waves.

Grouting - a process whereby fluids (either in suspension or solution) are injected into soil to decrease permeability, increase shear strength, and decrease compressibility.

Hazardous Material - "...any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety, or to the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, radioactive materials, and any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment."

Hazardous Materials Management - the handling, processing, storage, transport, disposal, and/or treatment of any hazardous material, including hazardous waste.

Hazardous Waste - any material meeting the definition and criteria for hazardous waste established by State and/or Federal laws and regulations and subject to State and/or Federal requirements for management as a hazardous waste.

Impervious Surface - a surface covered with an impermeable or low permeability material which prevents or inhibits infiltration of water. In the urban environment, impervious surfaces include roadway and parking pavements and building roofs.

Infiltration - the absorption and downward migration of water falling onto or flowing over previous materials, such as exposed soil.

Lateral spreading - the lateral displacement of liquefied soil under the influence of gravity.

Ldn - a measure of day/night noise levels, Ldn is an extension of the Leq but places greater emphasis on nighttime hours when people are typically at home. Noise levels between 10 PM and 7 AM are weighted to account for the greater intrusiveness of noise during nighttime hours.

Leq - an average of noise levels (energy equivalent) at a location over time. The Leq is considered a useful measure of an area's typical noise exposure over a long period of time, and usually is based on the dBA value.

Liquefaction - a phenomenon in which saturated (submerged), cohesionless soils experience a temporary loss of strength because of the buildup of excess pore water pressure, especially during cyclic loadings such as those induced by earthquakes. Soils most susceptible to liquefaction are loose, clean, saturated, uniformly graded, fine-grained sands.

Luminaires - a complete lighting unit.

Lumunous Contrast - the difference between levels of light.

Maximum Credible Earthquake (MCE) - the maximum event which may ever be expected within the known geologic framework.

Medical Surveillance - a series of regular medical examinations for individuals exposed or potentially exposed to hazardous materials, the purpose of which is to evaluate if such exposure has resulted in adverse health conditions.

Metals - those metals listed in 40 CFR or Title 26 CCR as being hazardous.

100-Year Storm Event - a rainstorm with a one percent ("one in one hundred") probability of occurring.

Open Space - Land that is either undeveloped or has been developed for passive or recreational uses.

Overflow Outfalls - structural components of the City combined sewer system which are designed and operated to allow discharge of combined storm water and sewage during conditions when the capacity of the storage/transport system and wastewater treatment facilities are exceeded.

Overland Flow - the flow of unchannelized storm water runoff over a land surface due to direct precipitation.

Permeability - a property of a porous medium (such as soil) that is a measure of the relative ease with which a fluid can be transmitted through the medium.

Pervious Surface - a surface covered with a material which allows infiltration of water. In the urban environment, pervious surfaces include lawns and unpaved areas of exposed soil.

Petroleum Hydrocarbons - mixture of organic compounds found in fuel and oil products refined from crude oil.

pH - a measure of the acidity or alkalinity of a solution which is based on the voltage potential created by the concentration of hydrogen ions (H+).

Photometric - relating to the measurement of light.

Pile caps - thick concrete sections at the top of the piles upon which the superstructure sits.

Polynuclear Aromatic Hydrocarbons - a class of organic chemicals which are both natural constituents of crude petroleum and formed as the result of incomplete combustion of organic materials.

Runoff - storm water generated during or after a precipitation event which is conveyed as surface water in streams or as sheet flow over the land surface.

Salinity - a measure of the amount of salt(s) in a solution (typically measured in parts per thousand).

Sea Wall(s) - a vertical barrier constructed to prevent flooding of an area at the margin of a body of water from waves or tidal action.

Sedimentation - the deposition of sediment transported by flowing water, air, or mass movement.

Semi-volatile organic compounds - a class of organic chemicals, synthetic and naturally occurring, which generally have low solubilities in water and moderately low boiling liquids.

Sheetpiles - interlocking metal sheets driven into the ground prior to excavation; they reduce water flow into the excavation and also contribute to its stability.

Shoring - refers to a system of vertical and horizontal wood and steel components designed to support the vertical faces of an excavation.

Siltation Fencing - barriers designed for the purpose of trapping sediment eroded and transported by runoff.

Site Mitigation Report - a document describing health and safety risks associated with hazardous materials present at a site and outlining recommended measures for mitigation of potential risks.

Slurry walls - constructed by excavating deep trenches around the perimeter of the excavation and filling them with cement bentonite slurry. These walls also cutoff the flow of water into excavations.

Solvents - organic compound, usually in liquid form, used to dissolve other substances.

Visual Quality - an evaluative appraisal of the relative excellence of a view or a sequence of view.

Urban Design - the physical character and order of a city.

Upward Component - the portion of output from a lighting source that is cast upward.

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Section 4(f) Evaluation

Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure

AUGUST 1995

Prepared for
The City and County of San Francisco

Prepared by
Public Affairs Management
and
Parsons, Brinckerhoff, Quade & Douglas, Inc.
with assistance from
The San Francisco Planning Department

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1. INTRODUCTION

This report presents the Section 4(f) Evaluation of the proposed project: Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure. This evaluation is being undertaken to achieve compliance with Section 4(f) of the Department of Transportation Act of 1966, codified at 49 U.S.C. 303. Section 4(f) declares that it is the policy of the United States Government that special effort be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. Section 4(f) permits the Secretary of Transportation to approve an action or project that requires the use of publicly-owned land from a public park, recreation area or wildlife refuge of national, state or local significance, or any land from a historic site of national, state or local significance, only if the following determinations have been made: 1) there is no feasible and prudent alternative to the use of such land, and 2) all possible planning has been undertaken to minimize harm to Section 4(f) lands resulting from such use.

The following evaluation describes Section 4(f) properties identified within the project study area, and concludes that all build alternatives would "use" Assessor's Block 202, if the project compensated the Port of San Francisco for revenue loss due to parking displacement by constructing an underground parking structure at that location. As addressed in the evaluation, no feasible alternative locations for this replacement parking have been identified within a prudent proximity to the parking spaces that would be displaced in the Embarcadero median. If the parking garage was constructed, Block 202 would be returned to its existing condition following construction, or would be developed with similar landscape features determined through coordination with the Recreation and Park Department.

As originally designed, Alternative 5 would also "use" a portion of Justin Herman Plaza, which is under the jurisdiction of the San Francisco Recreation and Park Department. Alternatives to this design exist, and intrusion into the Plaza would be eliminated by reducing the size of the proposed roadway median. Results of this redesign are referred to as "Mitigated Alternative Five." No other "use" of 4(f) resources would occur. Discussion of other 4(f) and potential 4(f) resources is provided for informational purposes.

This evaluation is prepared in conjunction with the Draft Environmental Impact Statement/Environmental Impact Report (DEIS/EIR) analyzing Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure A Final

Section 4(f) Evaluation will be prepared after the DEIS/EIR public review period. The Final Section 4(f) Evaluation will respond to all comments received regarding the Draft 4(f) Evaluation during the public review period.

2. DEFINITION OF ALTERNATIVES

The Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure are part of a group of improvements along the waterfront in San Francisco. The South Embarcadero project and the North Embarcadero project are currently under construction as separate projects. The South Embarcadero project will have two lanes in each direction between King Street and Folsom Street. The North Embarcadero project, from Broadway to North Point, will also include two lanes in each direction.

All of the alternatives described below assume the construction of the MUNI F-line light rail from Market Street to Fisherman's Wharf within the median of The Embarcadero roadway, but as a separate project. In addition, the alternatives assume completion of the MUNI Metro Extension and the MUNI Metro Turnback which are both under construction.

All of the alternatives also assume that certain street modifications and traffic improvements would be in place in the project area by the analysis year of 2015. These include the re-striping of Folsom Street between The Embarcadero and Main Street to permit two-way operations. These improvements are either part of other current projects which are under construction or are assumed to be implemented as separate projects.

2.1 ALTERNATIVE 1: NO BUILD

The No-Build Alternative does not propose any project-related construction and reflects most closely the street network and ramp connections that currently exist within the project area (Figure 2.1). The Terminal Separator Structure (TSS) would not be rebuilt, neither would any replacement ramps from I-80/U.S. 101 to the Embarcadero surface roadway.

The Embarcadero between Howard Street and Broadway would retain its current alignment and lane configuration: three continuous lanes in each direction. Between Folsom Street and Howard Street, The Embarcadero would be realigned to the west to conform with the South Embarcadero alignment. The southbound roadway is under construction as part of the MUNI Metro Turnback project. Under the No-Build Alternative, the northbound roadway would be constructed as a separate project.

Improvements Included in this Alternative

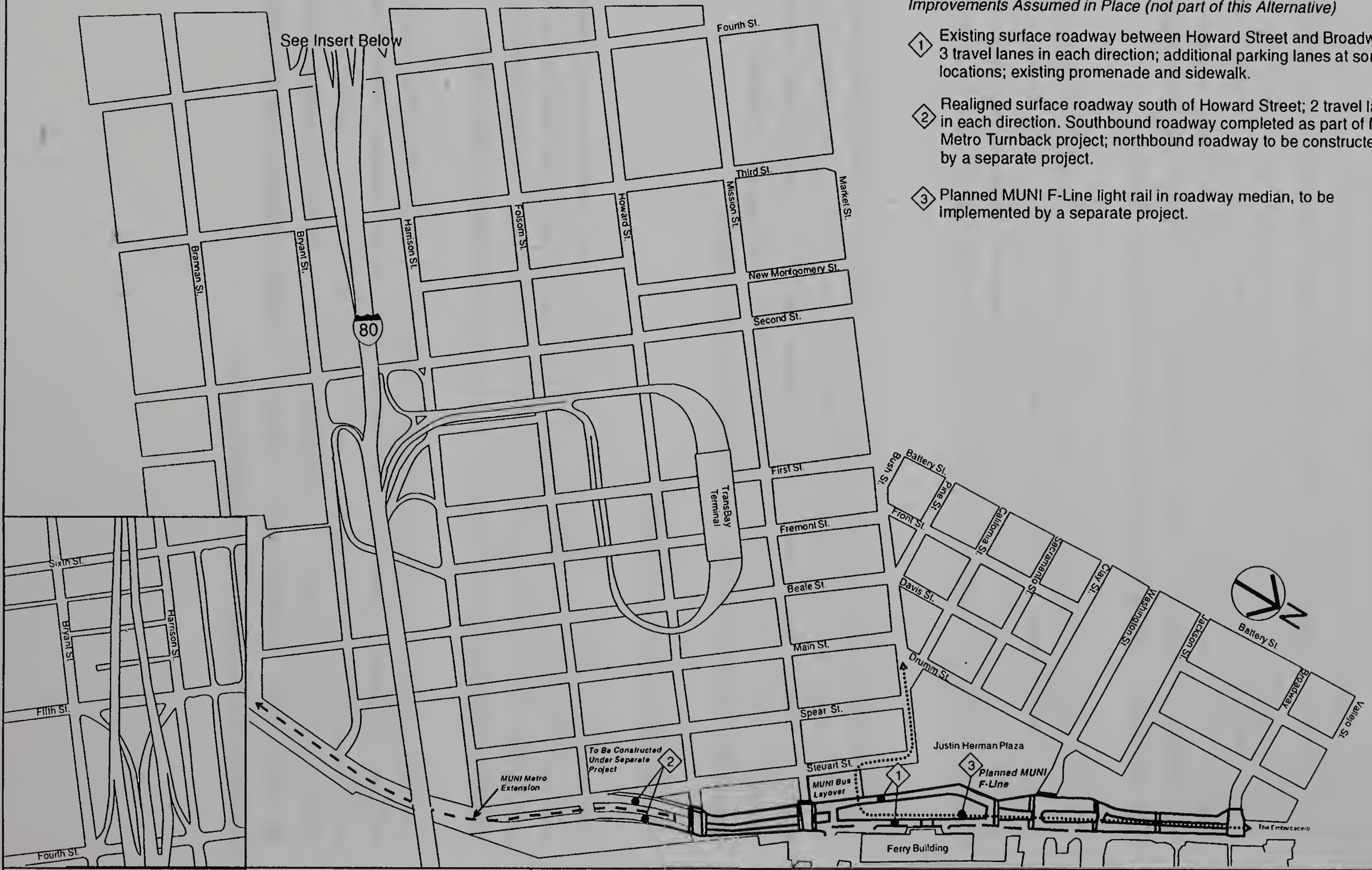
None Proposed.

Improvements Assumed in Place (not part of this Alternative)

1. Existing surface roadway between Howard Street and Broadway; 3 travel lanes in each direction; additional parking lanes at some locations; existing promenade and sidewalk.

2. Realigned surface roadway south of Howard Street; 2 travel lanes in each direction. Southbound roadway completed as part of MUNI Metro Turnback project; northbound roadway to be constructed by a separate project.

3. Planned MUNI F-Line light rail in roadway median, to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

LEGEND

- - - MUNI Metro Extension
•••••••• MUNI F-Line

GRAPHIC SCALE

0 100' 200' 300' 400' 500' 600' 700' 800' 900' 1000'

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE ONE
No Build

Figure 2-1

The current signalized intersections of The Embarcadero with Howard, Mission, Market, Washington and Broadway would remain. The intersection at Folsom Street would be signalized as part of the South Embarcadero project. There would be no direct vehicular connection between The Embarcadero and Market Street, and the existing traffic signal in front of the Ferry Building would remain for pedestrians only. The existing unsignalized, mid-block pedestrian crossings at the northern end of the Ferry Building (near Clay), in front of Pier 3 (near Jackson), and in front of Pier 5, would also remain. The northbound U-turn north of Washington Street would be eliminated by the MUNI F-line project.

2.2 ALTERNATIVE 2: MID-EMBARCADERO ROADWAY

This alternative would reconstruct the section of The Embarcadero between Folsom and Broadway so that it resembles the roadway to the north and south (Figure 2.2), with the MUNI F-line in the roadway median. The TSS would not be rebuilt, nor would any replacement ramps from I-80/U.S. 101 to the Embarcadero surface roadway. A package of local street and intersection improvements, including re-striping and operational changes, would be implemented as part of this alternative to improve traffic flow and access to and from the freeways.

Between Folsom and Howard Streets, The Embarcadero would be realigned to the west to conform with the South Embarcadero alignment. The southbound roadway is currently under construction as part of the MUNI Metro Turnback project. The northbound roadway would be constructed with two travel lanes as part of this alternative. A new promenade along the northbound roadway between Folsom and Harrison Streets would be constructed as part of this alternative.

Between Howard and Broadway there would be two travel lanes in each direction on The Embarcadero plus a parking lane, which would convert to a third travel lane during the peak periods. The northbound lanes would generally follow the alignment of the existing roadway, except in front of the Ferry Building the roadway would curve slightly towards the west to create a wider promenade. The southbound lanes would run parallel to the northbound roadway. There would be a left-turn lane in the northbound direction approaching Howard, Washington and Broadway; and a left-turn lane in the southbound direction approaching Washington and Mission Streets.

Improvements Included in this Alternative

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

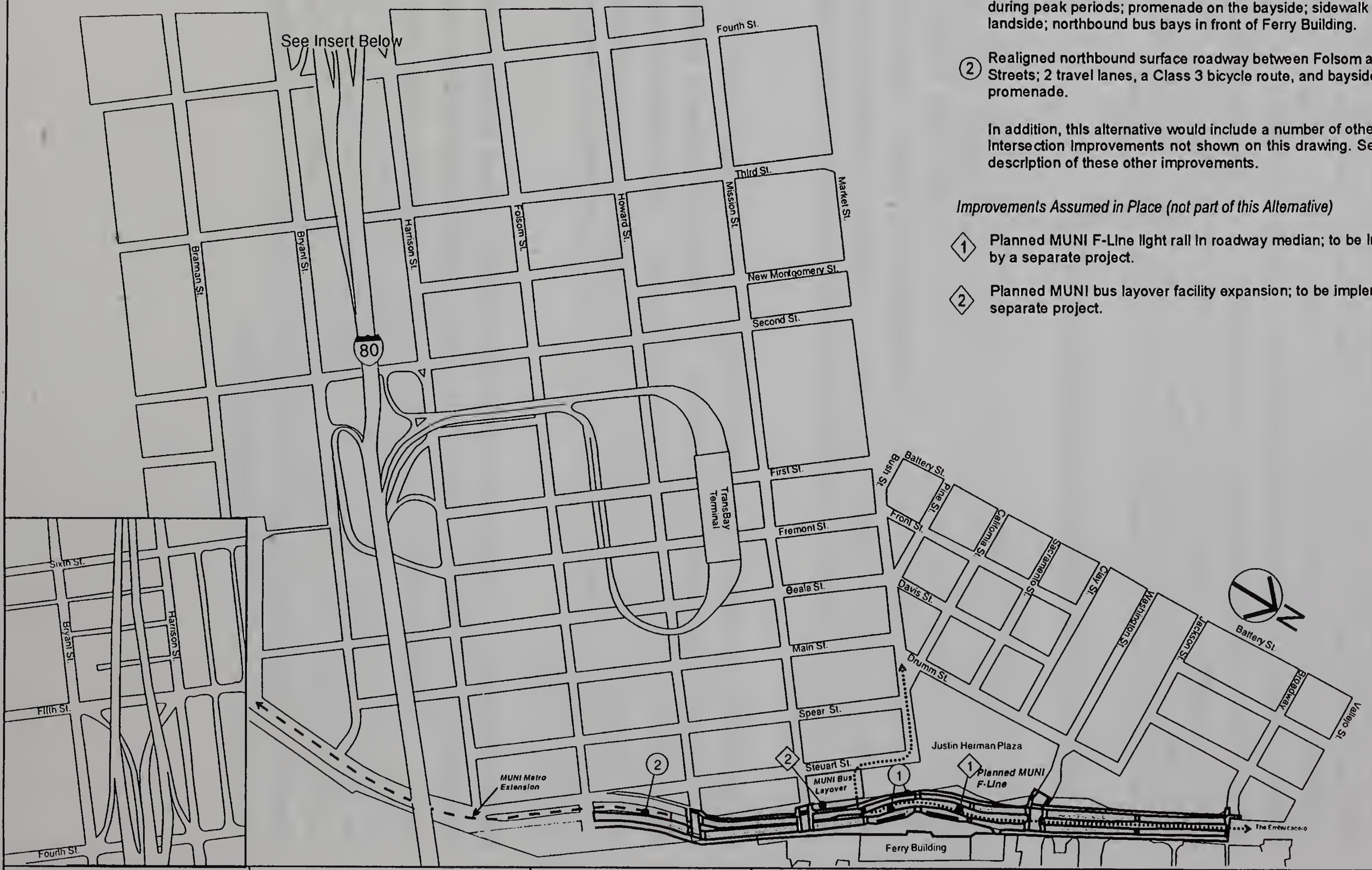
② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, a Class 3 bicycle route, and bayside promenade.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

LEGEND

- - - MUNI Metro Extension
.... MUNI F-Line
▬ Bus Bay

GRAPHIC SCALE

0 100' 200' 300' 400' 500' 600' 700' 800' 900' 1000'

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE TWO
Mid-Embarcadero Roadway

Figure 2-2

The intersections of The Embarcadero with Howard, Mission, Market, Washington and Broadway would be signalized with pedestrian crossings. The intersection at Folsom Street would be signalized as part of the South Embarcadero project, which is under construction. There would be no direct vehicular connection between The Embarcadero and Market Street, and the traffic signal at the Ferry Building would be for pedestrians only. Signalized mid-block pedestrian crossings would be located at the northern end of the Ferry Building and at approximately mid-way between Washington Street and Broadway.

2.3 ALTERNATIVE 3: MID-EMBARCADERO ROADWAY AND NEW PENINSULA ACCESS RAMPS (Options A and B)

Alternative 3 would reconstruct The Embarcadero surface roadway between Folsom Street and Broadway to resemble the roadway to the north and south (Figures 2.3 & 2.4), construct new ramps for access to and from the Peninsula, modify the existing Fremont Street off-ramp from the Bay Bridge, and implement a package of local street and intersection improvements to facilitate traffic flow and access to the freeway.

The Embarcadero surface roadway between Folsom Street and Broadway would be reconstructed to the same alignment and lane configuration as Alternative 2, except that the northbound roadway between Folsom and Howard Streets would carry two travel lanes plus a parking lane, which would convert to a third travel lane during peak periods. The reconstructed roadway would have the same signalized intersection and mid-block pedestrian crossing improvements as in Alternative 2. The Muni F-Line would be accommodated in the reconstructed roadway median as a separate project. A new promenade along the northbound roadway between Folsom and Harrison Streets would be constructed as part of this alternative.

Alternative 3 would not reconstruct the TSS. Instead, it would construct new ramp connections between surface streets and I-80/U.S. 101 for access to and from the Peninsula.

Improvements Included in this Alternative - Second Street Option

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, plus a parking lane and a Class 3 bicycle route; parking lane convertible to a third travel lane during peak periods; bayside promenade.

③ New on-ramp from Harrison Street to I-80 westbound and U.S. 101 southbound; modified main line striping at Fourth Street from lane-add to simple merge.

④ New off-ramp from I-80 eastbound to Second Street.

⑤ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

⑥ Davis Street open to vehicular traffic between Clay and Washington Streets.

⑦ Conversion of Sterling Street on-ramp from PM peak period HOV operations to mixed-flow operation.

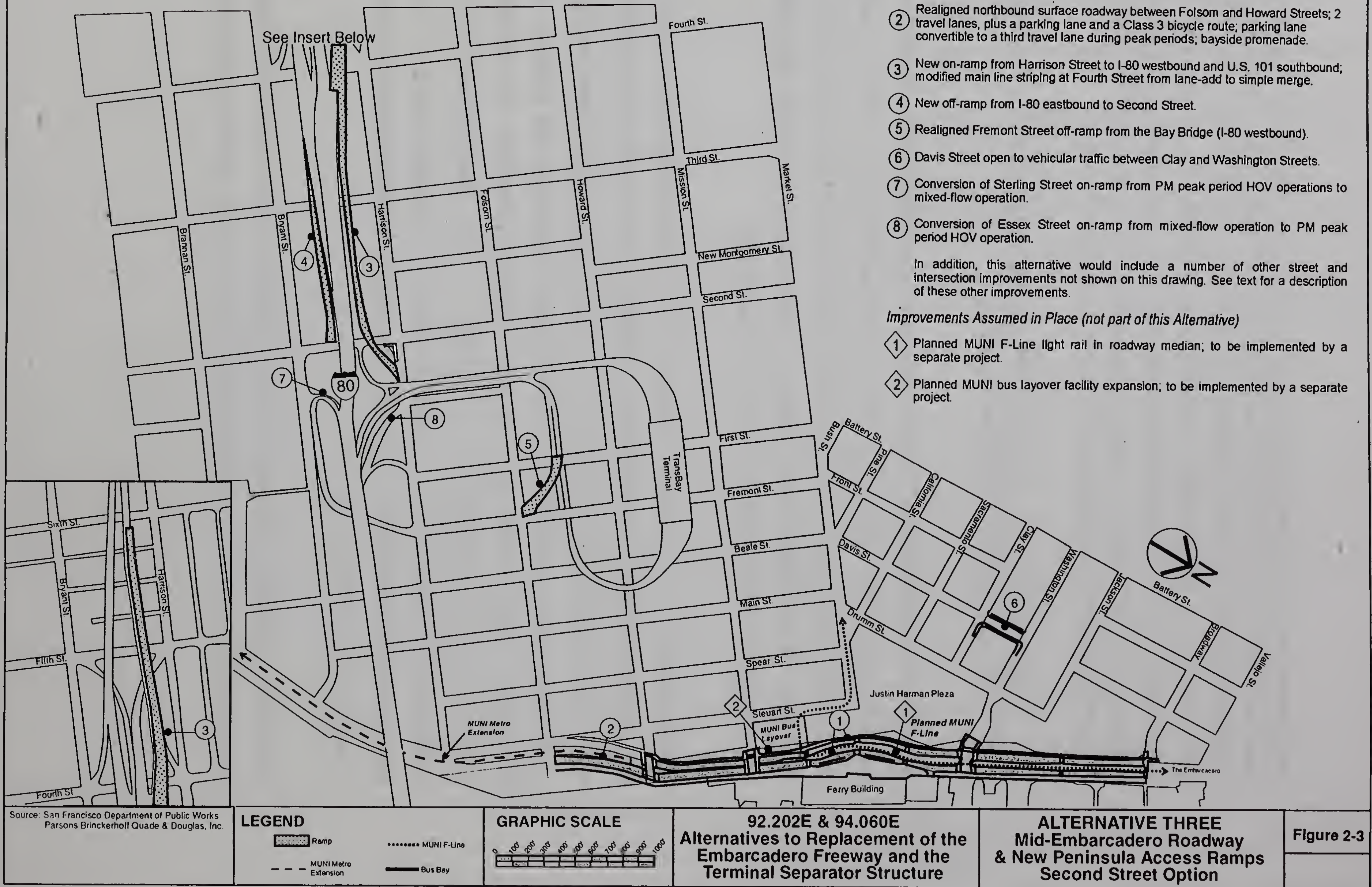
⑧ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.

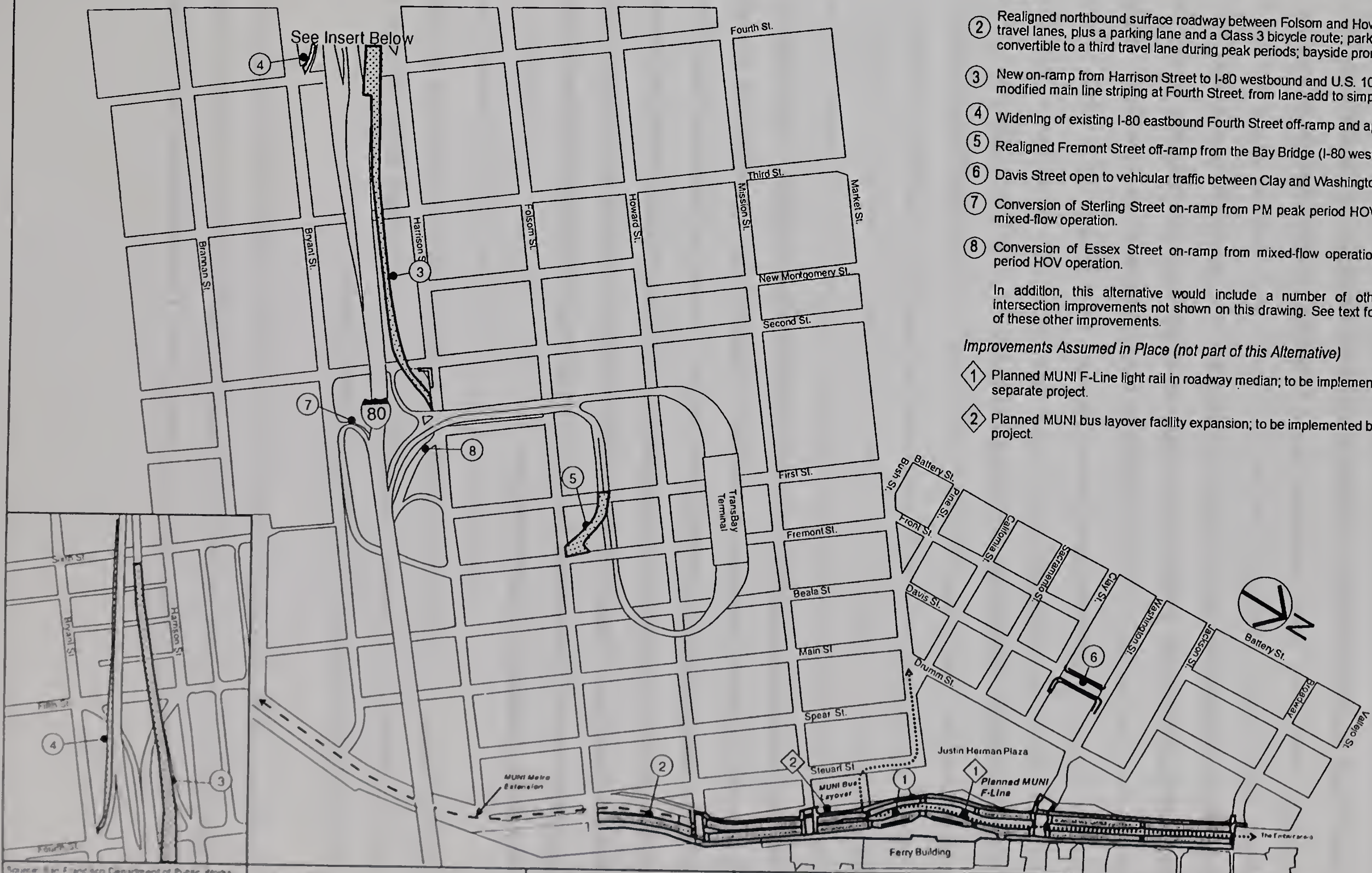


Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE THREE
Mid-Embarcadero Roadway & New Peninsula Access Ramps
Second Street Option

Figure 2-3



Improvements Included in this Alternative - Fourth Street Option

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, plus a parking lane and a Class 3 bicycle route; parking lane convertible to a third travel lane during peak periods; bayside promenade.

③ New on-ramp from Harrison Street to I-80 westbound and U.S. 101 southbound; modified main line striping at Fourth Street. from lane-add to simple merge.

④ Widening of existing I-80 eastbound Fourth Street off-ramp and approach.

⑤ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

⑥ Davis Street open to vehicular traffic between Clay and Washington Streets.

⑦ Conversion of Sterling Street on-ramp from PM peak period HOV operations to mixed-flow operation.

⑧ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.

Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

LEGEND

▭ Ramp
········ MUNI F-Line
– – – MUNI Metro Extension
━━ Bus Bay

GRAPHIC SCALE

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE THREE
Mid-Embarcadero Roadway & New Peninsula Access Ramps
Fourth Street Option

Figure 2-4

For access to the Peninsula, a new on-ramp would be built from west of the Harrison Street/Essex Street intersection to connect to I-80 westbound/U.S. 101 southbound. The Harrison Street/Essex Street intersection would be rebuilt to accommodate the new on-ramp. Essex Street, currently two-way with two lanes in each direction, would be made a one-way street with four lanes. Two lanes would be PM peak-hour HOV lanes leading to I-80 eastbound, using the existing Essex Street on-ramp, while the other two would be mixed-flow lanes leading to I-80 westbound/U.S. 101 southbound. Harrison Street would be made a one-way westbound street between First and Third Streets. There would be two left-turn lanes on the westbound Harrison Street approach to the I-80 westbound/U.S. 101 southbound ramp. The intersection of Harrison Street with the new on-ramp would be signal-controlled. The existing Sterling Street on-ramp to I-80 eastbound, which currently operated as a PM peak-period HOV ramp, would be converted to mixed-flow operation at all times.

Two options are under consideration for traffic access from the Peninsula. Under Option A, a new I-80 eastbound off-ramp would be built to touch down at Second Street between Harrison Street and Bryant Street (Figure 2.3, pg.8). A new signal is assumed at the I-80 eastbound off-ramp/Second Street intersection. The off-ramp approach would include two left-turn lanes and a right-turn lane. Traffic would be directed north towards The Embarcadero during the AM peak hour, and left turns from Second Street southbound onto Bryant Street eastbound would be prohibited.

Option B would not construct a new off-ramp, but would widen the Fourth Street off-ramp and the eastbound I-80 mainline between Sixth Street and the Fourth Street off-ramp to provide additional capacity on the existing off-ramp (Figure 2.4).

In this alternative, the existing alignment of the mid-block Fremont Street off-ramp (the right-hand exit ramp from the Bay Bridge) would be modified so that it would touch down at the intersection of Fremont Street and Folsom Street. The reconstructed Fremont Street off-ramp would be four lanes wide, the two right-hand lanes directing traffic towards Folsom Street, and the other two towards Fremont Street. This configuration would require a three-phase signal at this intersection.

Alternative 3 would also include reopening of Davis Street between Clay and Washington Streets to vehicular traffic, and other local street and intersection improvements to facilitate traffic circulation and access to and from the freeway.

2.4 ALTERNATIVE 4: MID-EMBARCADERO ROADWAY WITH TRAFFIC MODIFICATIONS

Alternative 4 is identical to Alternative 2, except it would include modifications to the existing Fremont Street off-ramps and operational changes to the Sterling Street and Essex Street on-ramps (Figure 2.5). The existing Fremont Street off-ramp at mid-block between Folsom and Howard Streets would be reconfigured as in Alternative 3. Minor curb improvements would be made to the intersection of Harrison Street with the left-hand exit ramp from the Bay Bridge, to facilitate right turns from the off-ramp. The existing Essex Street on-ramp to I-80 eastbound would be limited to HOV operation during PM peak-period and the Sterling Street on-ramp would be open to mixed-flow traffic at all times. As in Alternative 2, a package of local street and intersection improvements would be implemented to facilitate traffic flow and access to the freeway.

Improvements Included in this Alternative

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, bicycle route, and bayside promenade.

③ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

④ Conversion of Sterling Street on-ramp from PM peak period HOV operation to mixed-flow operation.

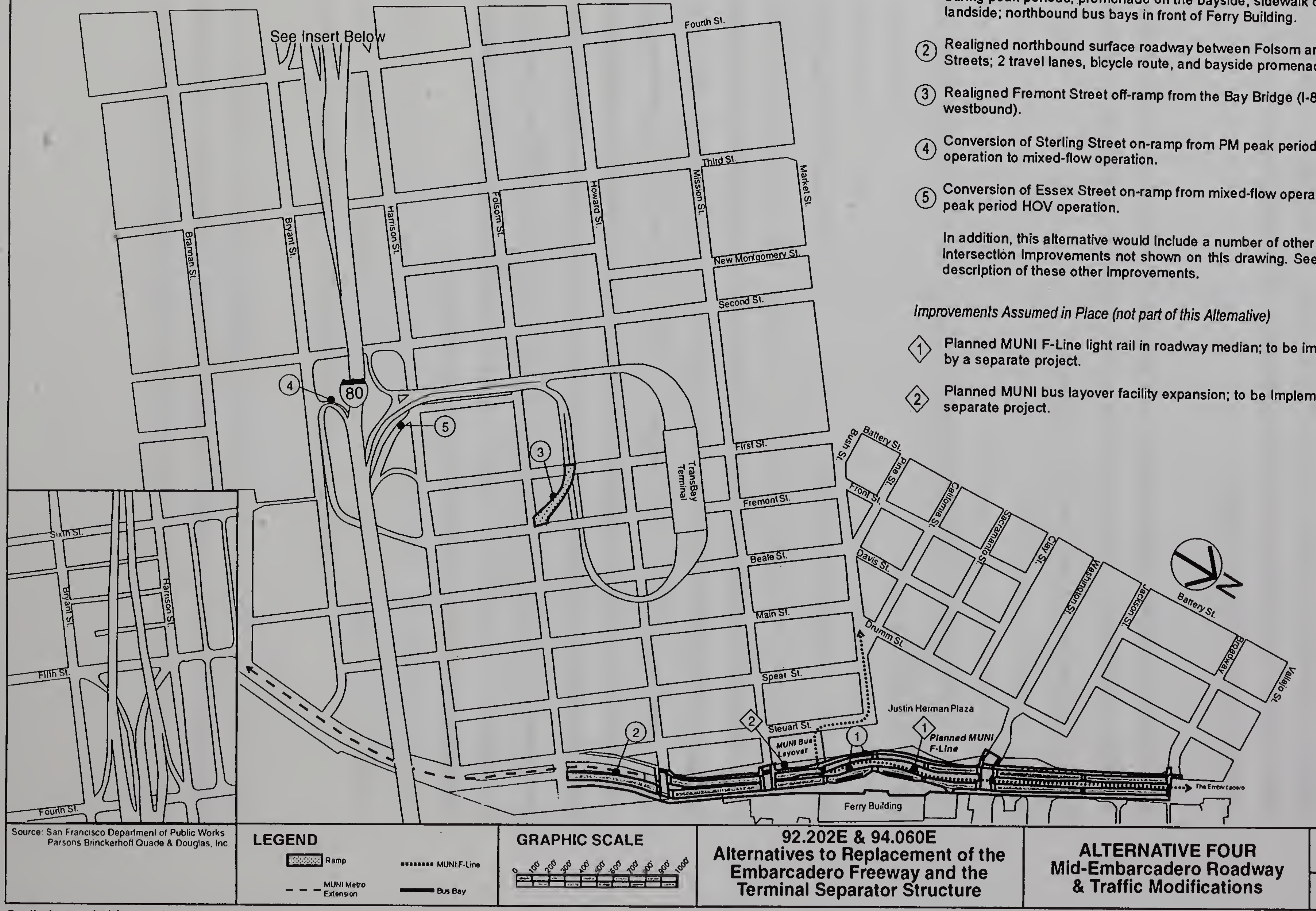
⑤ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE FOUR
Mid-Embarcadero Roadway & Traffic Modifications

Figure 2-5

Preliminary, Subject to Revision

2.5 ALTERNATIVE 5: CURVED MID-EMBARCADERO ROADWAY WITH NEW PENINSULA ACCESS RAMPS (Options A and B)

Alternative 5 is identical to Alternative 3, except that it proposes a curved alignment for the southbound Embarcadero Roadway across from the Ferry Building (Figure 2.6).

The southbound lanes would separate from the northbound lanes and bow westward directly in front of the Ferry Building, creating a slight incursion into the Justin Herman Plaza area (approximately 0.15 hectare [0.37 acre]). The bow would create a public plaza and provide room for a turnaround track for the MUNI F-Line in the central median. Parking in front of the Ferry Building would be removed.

As in Alternative 3, this alternative would have two points for new access ramps connecting to I-80/U.S. 101. Option A would construct a new westbound I-80 on-ramp at Harrison Street and an eastbound I-80 off-ramp at Second Street (Figure 2.6). Option B would construct the westbound I-80 on-ramp and widen the existing I-80 eastbound off-ramp at Fourth Street (Figure 2.7).

As in Alternative 3, Alternative 5 would include reopening of Davis Street between Clay and Washington Streets to vehicular traffic, reconstructing the Fremont Street off-ramp to touchdown at the intersection of Fremont and Folsom Streets, and implementing various other local traffic and operational improvements to facilitate circulation and access to the freeway.

Improvements Included in this Alternative - Second Street Option

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, plus a parking lane and a Class 3 bicycle route; parking lane convertible to a third travel lane during peak periods; bayside promenade.

③ New on-ramp from Harrison Street to I-80 westbound and U.S. 101 southbound; modified main line striping at Fourth Street from lane-add to simple merge.

④ New off-ramp from I-80 eastbound to Second Street.

⑤ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

⑥ Davis Street open to vehicular traffic between Clay and Washington Streets.

⑦ Conversion of Sterling Street on-ramp from PM peak period HOV operations to mixed-flow operation.

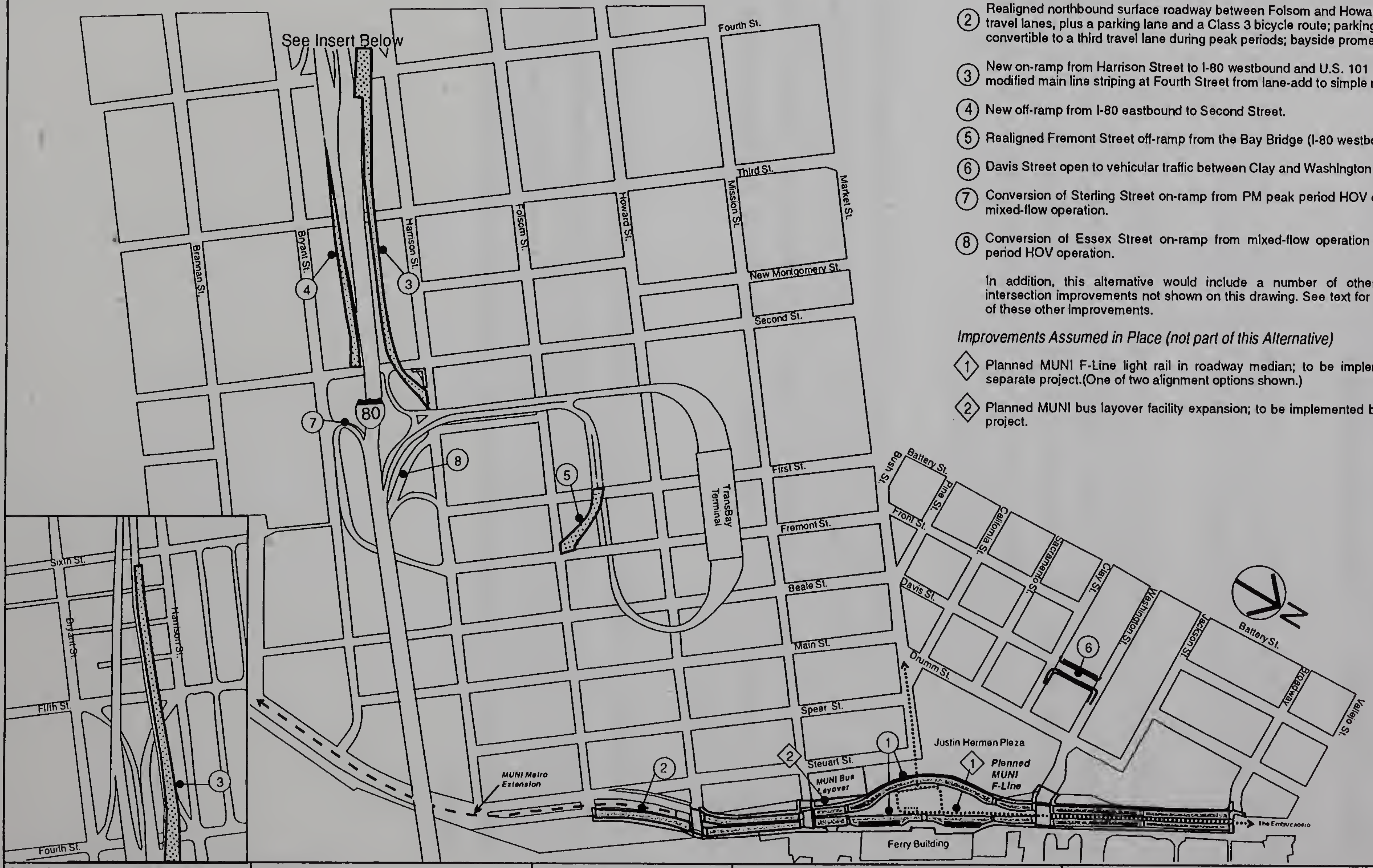
⑧ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other Improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project.(One of two alignment options shown.)

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE FIVE
Curved Mid-Embarcadero Roadway & New Peninsula Access Ramps Second Street Option

Figure 2-6

Preliminary, Subject to Revision

Improvements Included in this Alternative - Fourth Street Option

① Reconstructed surface roadway between Howard Street and Broadway; 2 travel lanes plus a parking lane and a Class 3 bicycle route in each direction; parking lanes convertible to a third travel lane during peak periods; promenade on the bayside; sidewalk on the landside; northbound bus bays in front of Ferry Building.

② Realigned northbound surface roadway between Folsom and Howard Streets; 2 travel lanes, plus a parking lane and a Class 3 bicycle route; parking lane convertible to a third travel lane during peak periods; bayside promenade.

③ New on-ramp from Harrison Street to I-80 westbound and U.S. 101 southbound; modified main line striping at Fourth Street from lane-add to simple merge.

④ Widening of existing I-80 eastbound Fourth Street off-ramp and approach.

⑤ Realigned Fremont Street off-ramp from the Bay Bridge (I-80 westbound).

⑥ Davis Street open to vehicular traffic between Clay and Washington Streets.

⑦ Conversion of Sterling Street on-ramp from PM peak period HOV operations to mixed-flow operation.

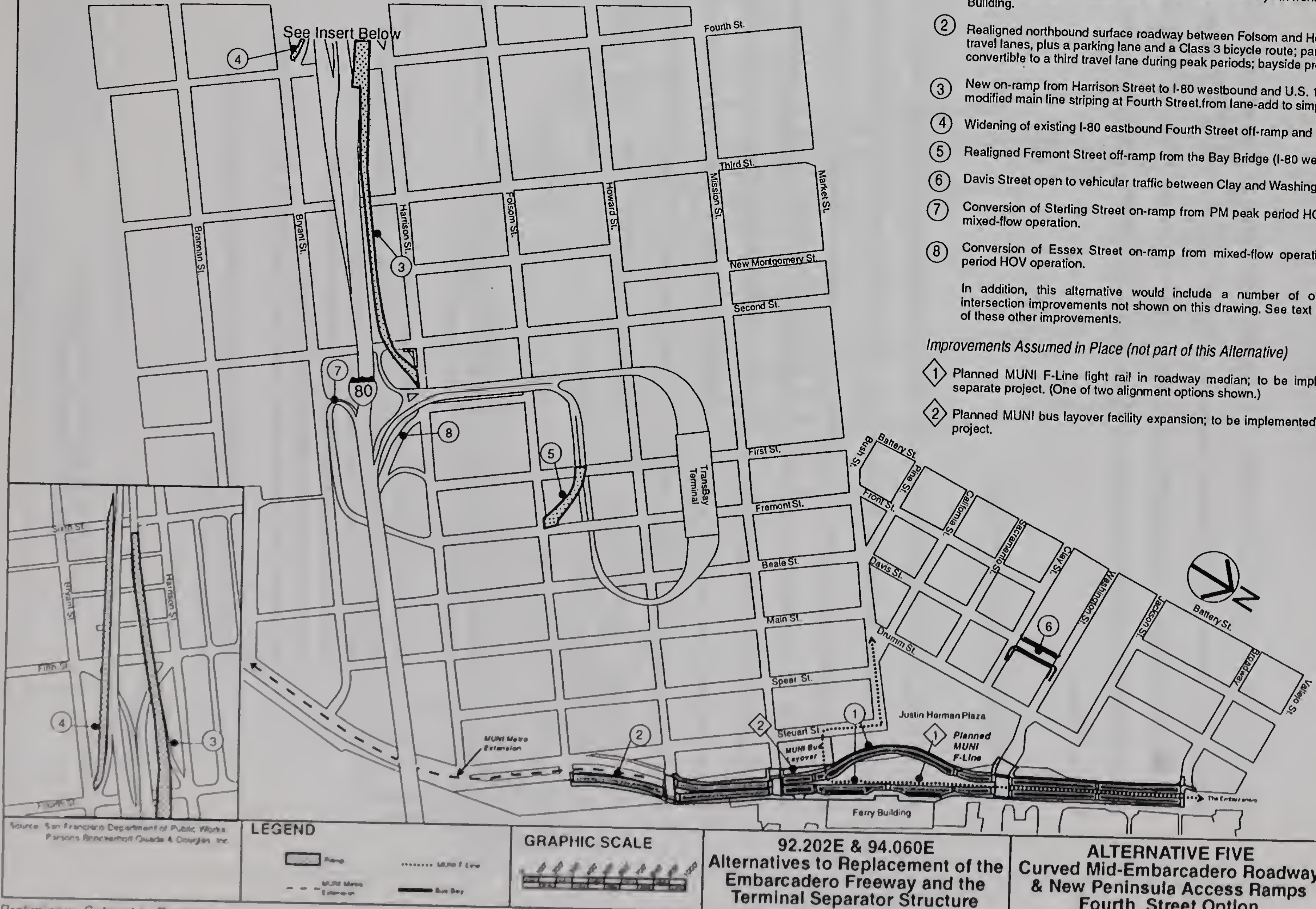
⑧ Conversion of Essex Street on-ramp from mixed-flow operation to PM peak period HOV operation.

In addition, this alternative would include a number of other street and intersection improvements not shown on this drawing. See text for a description of these other improvements.

Improvements Assumed in Place (not part of this Alternative)

◇1 Planned MUNI F-Line light rail in roadway median; to be implemented by a separate project. (One of two alignment options shown.)

◇2 Planned MUNI bus layover facility expansion; to be implemented by a separate project.



Source: San Francisco Department of Public Works
Parsons Brinckerhoff Quade & Douglas, Inc.

Preliminary, Subject to Revision

92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

ALTERNATIVE FIVE
Curved Mid-Embarcadero Roadway & New Peninsula Access Ramps
Fourth Street Option

Figure 2-7

3. SECTION 4(f) PROPERTIES

The Section 4(f) study area (see Figure 3.1) for the Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure Project contains a number of Section 4(f) properties. These properties include publicly-owned parks, as well as historic properties and archaeological resources which are on or eligible for the National Register of Historic Places.

3.1 PUBLICLY-OWNED PARKS[1]

The following section describes in detail the publicly-owned parks of national, state or local significance within the Section 4(f) study area. Parks which are currently planned within the study area are also discussed in this section. The location of existing and planned public parks within the project study area and their relationship to the project corridor are depicted on Figures 3.1 and 3.7 respectively. A summary of existing publicly-owned parks within the project area is provided in Table 3.1. In addition to the parks described here, two other areas were considered during this analysis and were determined not to meet the definition of 4(f) resources. These two areas, Davis Street and the Bayside Plaza office plaza are described in sub-section 3.1.10 Non-4(f) Resources.

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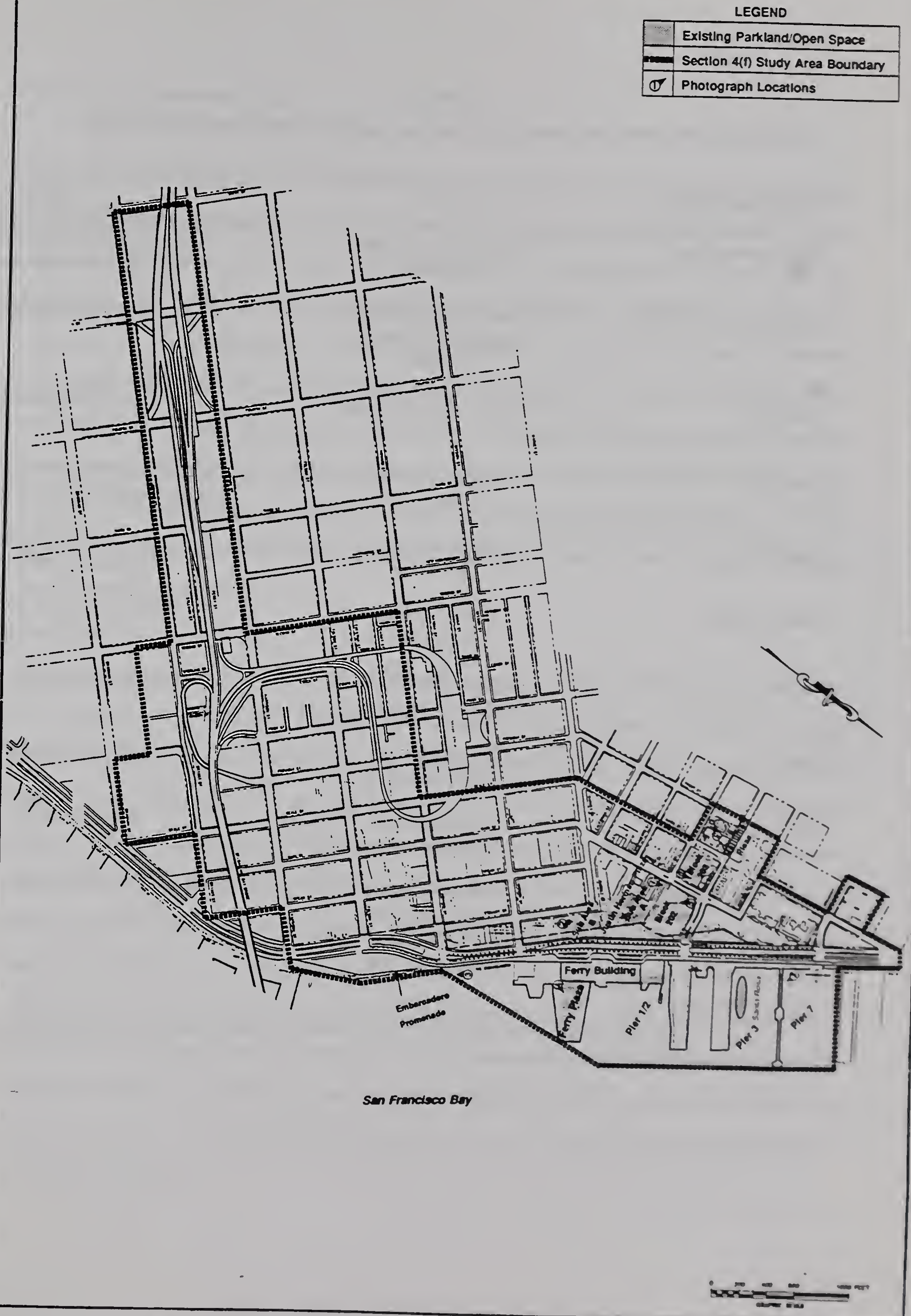
[1] Information regarding Publicly Owned Parks within the study area was compiled from a number of sources including:

- I-280 Transfer Concept Program Environmental Impact Report, September 28, 1984.
- Muni Metro Turnaround Project Final Environmental Impact Report, August 1989.
- San Francisco Master Plan, Recreation and Open Space Element, July 1987
- Field surveys of the project study area conducted in February 1993.
- User surveys of selected parks conducted in April 1994.
- San Francisco Park and Recreation Department, Facilities List, Revised December 24, 1991
- Telephone interview with Deborah Learner, San Francisco Recreation and Park Department, April 20, 1994.



92.202E & 94.060E
Alternatives to Replacement of the
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Terminal Separator Structure

Existing Public Parkland/Open Space within Section 4(f) Study Area

Figure 3.1

Source: Public Affairs Management and Parsons, Brinckerhoff, Quade & Douglas, Inc.

TABLE 3.1

SUMMARY OF EXISTING PUBLICLY-OWNED PARKS WITHIN THE STUDY AREA

PARK/OPEN SPACE	SIZE	PRIMARY JURISDICTION
Justin Herman Plaza	13 760 square meters (3.4 acres)	San Francisco Recreation & Park Department
Embarcadero Promenade	500 meters (1,600 feet long) Mission to Harrison Streets	Port of San Francisco
Ferry Plaza	2 023 square meters (0.5 acres)	Port of San Francisco
Block 202	8 094 square meters (2.0 acres)	San Francisco Real Estate and Recreation & Park Departments*
Block 203	6 880 square meters (1.7 acres)	San Francisco Real Estate Department
Maritime Plaza	7 689 square meters (1.9 acres)	San Francisco Recreation & Park Department
Pier 7	3 121 square meters (33,600 square feet)	Port of San Francisco
Pier 1/2	279 square meters (3,000 square feet)	Port of San Francisco
Pier 1-1/2	93 square meters (1,000 square feet)	Port of San Francisco
Pier 3	930 square meters (10,000 square feet) 700 square meters -Santa Rosa (7,500 square feet)	Port of San Francisco

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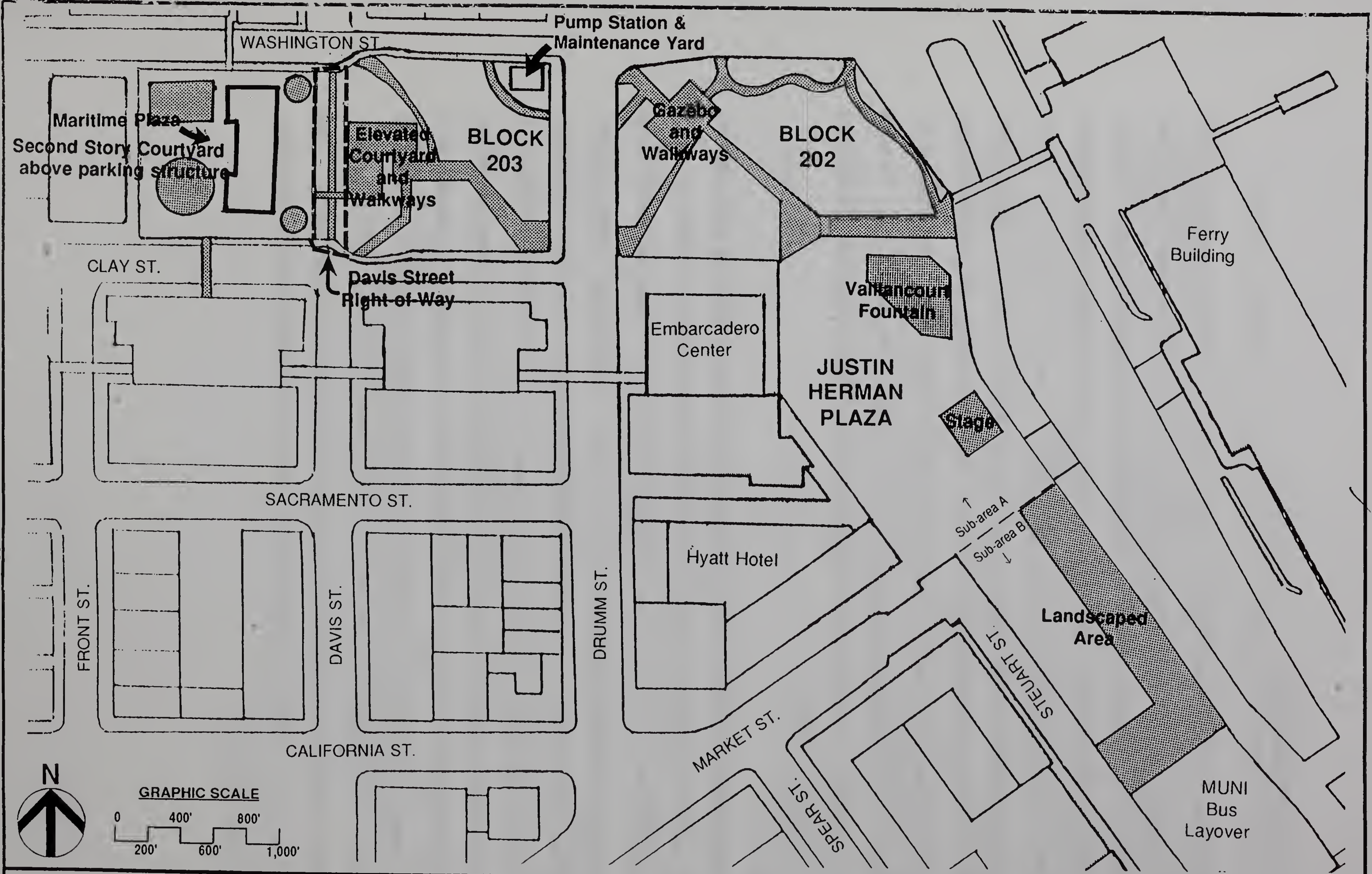
* Portions of Blocks 202 and 203 formerly owned by Caltrans and have been transferred in fee to the City and County of San Francisco.

3.1.1 Justin Herman Plaza

Justin Herman Plaza is a city-owned park of approximately 14 570 square meters (3.6 acres) under the primary jurisdiction of the San Francisco Recreation and Park Department. Other agencies with jurisdiction include the San Francisco Redevelopment Agency and the Department of City Planning. The park is located at the foot of Market Street along the west side of The Embarcadero roadway (see Figures 3.1 and 3.2). The park is situated immediately adjacent to the City's downtown office district, across The Embarcadero roadway from the San Francisco Bay Waterfront. Pedestrian access to the park is provided by the local street system including Market Street, Steuart Street, Washington Street, Clay Street and The Embarcadero roadway, as well as from the Embarcadero Center. Vehicle access to the Plaza is via the local street system, primarily Market Street, Steuart Street and The Embarcadero roadway.

The park contains brick paved areas, landscape trees and grass, a reflecting pool and free-form sculpture (Vaillancourt Fountain), and an open air stage (Figure 3.3, Photo 1). Justin Herman Plaza can be divided into two sub-areas: 1) Sub-area A, which contains the more popular and identifiable recreational amenities near the Embarcadero Center complex, including outside ground level restaurants and eating/sitting areas along the Embarcadero Center side of the plaza, and 2) Sub-area B, which is located to the south of Sub-area A, abuts the Muni bus layover lot to the south and contains pedestrian paths, statues and landscaping (Figure 3.3, Photo 2). Justin Herman Plaza is an important community focal point because it is near the Ferry Building, waterfront and other open space areas (Block 202 and the Embarcadero Promenade). Numerous civic gatherings (rallies, parades, sporting events) occur in and around the plaza making it one of the most intensely used plazas in the city. During the lunchtime hours, crowds of downtown office workers gather in the Plaza for lunch.



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Justin Herman Plaza and Adjacent Open Space

Figure 3.2

Source: Public Affairs Management and Parsons, Brinckerhoff, Quade & Douglas, Inc., 1993

Photo 1: Sub-area A

Photo 2: Sub-area B

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	**Photographs of Justin Herman Plaza**	**Figure 3.3**

Source: Public Affairs Management, 1993

Counts of the various types of park users in Justin Herman Plaza (both Sub-area A and Sub-area B) were conducted in April 1994. Counts were taken in the morning, during the lunch hour, and again in the afternoon over a three day period. The tabulated results of these surveys are contained in Appendix B to this report. The counts indicated that Sub-area A is more heavily used than Sub-area B. The most intensive use of the Plaza is for lunching with up to 450 people counted in Sub-area A at one time. The next most common uses of the Plaza are for sitting and walking.

Under the pre-earthquake condition, the elevated Embarcadero Freeway was in close proximity to the Plaza and cast a shadow over part of the plaza in the early morning hours. Under the current condition, the elevated freeway has been removed and the plaza is in sunlight throughout the morning hours until the afternoon when the adjacent office buildings and Embarcadero Center to the west shade the plaza.

3.1.2 Embarcadero Promenade

The Embarcadero Promenade is under the jurisdiction of the Port of San Francisco. Other agencies with jurisdiction include: The Bay Conservation and Development Commission (BCDC); and the San Francisco Redevelopment Agency (for portions in or adjacent to redevelopment areas). The Promenade is a walkway located along the east side (bay side) of The Embarcadero roadway which extends for approximately 500 meters (1,600 feet) from the foot of Mission Street south to Harrison Street (see Figure 3.1). The Promenade consists of a pedestrian sidewalk (varying in width from 3.8 to 9.0 meters [12.5 to 30 feet]), sitting areas, landscape trees and railing. Located at the north end is a free-standing cement wall near a set of tidal steps. The primary existing visual feature of the Promenade is a grouping of flagpoles and multi-colored flags located near the middle of the Promenade near the foot of Howard Street (see Figure 3.4, Photo 3). Plans for the improvement of the

Photo 3: Embarcadero Promenade

Photo 4: Ferry Plaza

92.202E & 94.060E **Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure**	**Photographs of Embarcadero Promenade and Ferry Plaza**	**Figure 3.4**

Source: Public Affairs Management, 1993

Promenade include the construction of a "art ribbon", a 2.5 mile continuous linear sculpture intended to be a metaphor of the juncture of the City and the Bay. The 5 foot wide ribbon will be bisected at the center by a solid band of glass block with internal illumination at night. The ribbon will be integrated into the streetscape (ie sidewalk, cement benches, etc.).

The Embarcadero Promenade is an extensively used pedestrian walkway. During the lunchtime hours the Promenade is an attractive location to eat lunch for downtown office workers. Other activities include walking, jogging and bicycling. The Promenade is also a destination for tourists because of its scenic vistas of both the Bay and downtown skyline. The Promenade is also the location of civic events which are held periodically throughout the year and attract large crowds.

Counts of the various types of users of the Embarcadero Promenade were conducted in April 1994. Counts were taken in the morning, during the lunch hour, and again in the afternoon over a three day period. The tabulated results of these surveys are contained in Appendix B to this report. The intensity and types of users of the Promenade varies with the time of day. In the morning and afternoon users are mostly walkers, joggers and people sitting. During the noon-time hours, however, usage of the Promenade intensifies greatly with lunching being the primary activity with an average of sixty (60) people eating lunch at any one time.

3.1.3 Ferry Plaza

Ferry Plaza is under the jurisdiction of the Port of San Francisco. BCDC also has jurisdiction over Ferry Plaza. The plaza is located directly behind (east of) the Ferry Building and in front of the Golden Gate Ferry terminal (see Figure 3.1). The plaza is approximately 2 023 square meters (0.5 acres) and includes raised planter areas landscaped with trees and ground covers. Sitting areas, a statue and benches are also provided (see Figure 3.4, Photo 4). Vehicle and pedestrian access to the plaza is via a driveway along the south end of the Ferry Building from The Embarcadero roadway. Pedestrians can also access the plaza via a walkway through the Ferry Building.

The Ferry Plaza is less intensely used than neighboring Justin Herman Plaza and the Promenade.[2] Uses are primarily confined to downtown office workers eating lunch, ferry passengers traveling to and from the ferry terminal, tourists who often linger in the plaza to take advantage of its views of the Bay and downtown skyline and fishermen who often line the railing of the pier. Occasionally, civic events or other activities are held in the plaza, but far less frequently than at Justin Herman Plaza.

3.1.4 Block 202

Block 202 (approximately 8 094 square meters [2.0 acres]) is located just north of Justin Herman Plaza and is bounded by Drumm Street on the west, Washington Street on the north and The Embarcadero roadway on the east (see Figures 3.1 and 3.2). The block is located immediately adjacent to the City's downtown office district. The name, Block 202, refers to the Assessor's block number for this property. A portion of Block 202 is currently under the jurisdiction of the San Francisco Real Estate Department, and a portion is under the jurisdiction of the San Francisco Recreation and Park Department. Both portions are designated as open space in the City's Master Plan and both are currently maintained by the San Francisco Recreation and Park Department.

The former Clay and Washington Street ramps to the Embarcadero Freeway passed over this block under the pre-earthquake conditions and cast a shadow over part of this block throughout the day. The areas under the freeway were landscaped and used as open space. Currently the entire block is used as open space (see Figure 3.5, Photo 5). The Golden

Photo 5: Block 202

Photo 6: Block 203

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	**Photographs of Block 202 and Block 203**	**Figure 3.5**

Source: Public Affairs Management

Gateway condominium complex is located to the north with private tennis court facilities located directly across Washington Street from Block 202. Block 202 currently consists of landscaped grass areas with a small sitting/gazebo area located near the corner of Drumm and Washington Street (see Figure 3.5, Photo 5). Vehicle access to this open space is via Drumm Street, Washington Street and The Embarcadero roadway. Pedestrian access is via local streets and from the Embarcadero Center.

Under the pre-earthquake condition, park uses on Block 202 were primarily confined to the gazebo and walkways located along this block's northern boundary due to the elevated freeway's close proximity and shadow affect. The parcel occupied by the freeway structure was generally not used as open space. Since demolition of the Embarcadero Freeway, the use of Block 202 as open space has increased. Currently this open space and its amenities are used by downtown office workers during the lunchtime hours. Some activity occurs during the evening hours as local residents stroll through the block's paths or use the volleyball court that had been erected during the summer months. Use of this open space, however, is much less intense than at neighboring Justin Herman Plaza.

Counts of the various types of users of Block 202 were conducted in April 1994. Counts were taken in the morning, during the lunch hour, and again in the afternoon over a three-day period. The tabulated results of these surveys is contained in Appendix B to this report. Use of Block 202 is relatively low, with 42 people being the most counted at any one time. During the noon-time period, surveyors observed an average of 30 users, primarily walkers and people sitting.

3.1.5 Block 203

Block 203 is located west of Block 202 across Drumm Street. As with Block 202, the name of this property references the Assessor's block number. Block 203 is bounded by Drumm

Street on the east, Clay Street on the south and Washington Street on the north and like Block 202 is located immediately adjacent to the City's downtown office district (See Figures 3.1 and 3.2). Davis Street, mapped but not constructed, forms the western boundary of Block 203. The majority of Block 203, which is approximately 6 880 square meters (1.7 acres), is under the jurisdiction of the San Francisco Real Estate Department. The entire block is designated as open space in the City's Master Plan, and is maintained by the San Francisco Recreation and Park Department. Although the Davis Street right-of-way functions as a part of the existing open space or Block 203, and provides pedestrian access between Washington and Clay Streets, the area is considered by the city to be street right-of-way. (See Section 3.1.10, below.)

Prior to demolition of the Embarcadero Freeway, the open space on Block 203 was occasionally used by downtown office workers during the lunchtime hours. The intensity of use was significantly less than at Justin Herman Plaza because much of the block was occupied by the former Washington and Clay Street ramps which touched down in this block, making much of the open space unusable. With demolition of the Embarcadero Freeway, use of the open space on Block 203 has increased. This could be attributed to the removal of the ramps and elevated freeway structure which cast much of the block in shadow throughout the day. Current uses primarily consist of downtown office workers using the benches and walkways during the lunchtime hours and persons travelling between the Embarcadero Center and Jackson Square area during the morning and evening hours.

Block 203 currently provides public open space and contains a San Francisco Department of Public Works pump station and Recreation and Park Department maintenance yard at the corner of Washington and Drumm streets, landscaped grass area and a pedestrian walkway which connects Clay and Washington Streets (see Figure 3.5, Photo 6).

Counts of the various types of users of Block 203 were conducted in April 1994. Counts were taken in the morning, during the lunch hour, and again in the afternoon over a three day period. The tabulated results of these surveys is contained in Appendix B to this report. Use of Block 203 is quite low for its location in such an urbanized setting, with twenty (20) people being the most counted at any one time. Use is highest in the afternoons with an average of 18 users, primarily walkers.

3.1.6 Pier 7

Pier 7 is under the jurisdiction of the Port of San Francisco and is located along The Embarcadero roadway just south of Broadway (see Figure 3.1). BCDC also has jurisdiction over Pier 7. Pier 7 is a recreation and public access pier. (approximately 3 120 square meters [33,600 sq. ft.]) The pier includes light standards, benches and viewing areas (see Figure 3.6, Photo 7). Vehicle and pedestrian access to the pier is via The Embarcadero roadway.

The pier is used by office workers in the Jackson Square and Levi's Plaza areas during the lunchtime hours. In addition, the pier is frequented by tourists taking advantage of the unique views of the Bay, Coit Tower and the downtown skyline.[2]

3.1.7 Maritime Plaza

Maritime Plaza is a second story courtyard located north west of Justin Herman Plaza just north of the Two Embarcadero Plaza Office Building. The Plaza is bounded by Clay Street to the south, Washington Street to the north, the Davis Street right-of-way (currently a

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[2] Counts of the types and number of users at these parks or public open space areas were notconducted because these parks and open space areas would not be directly or indirectlyaffected by project alternatives.

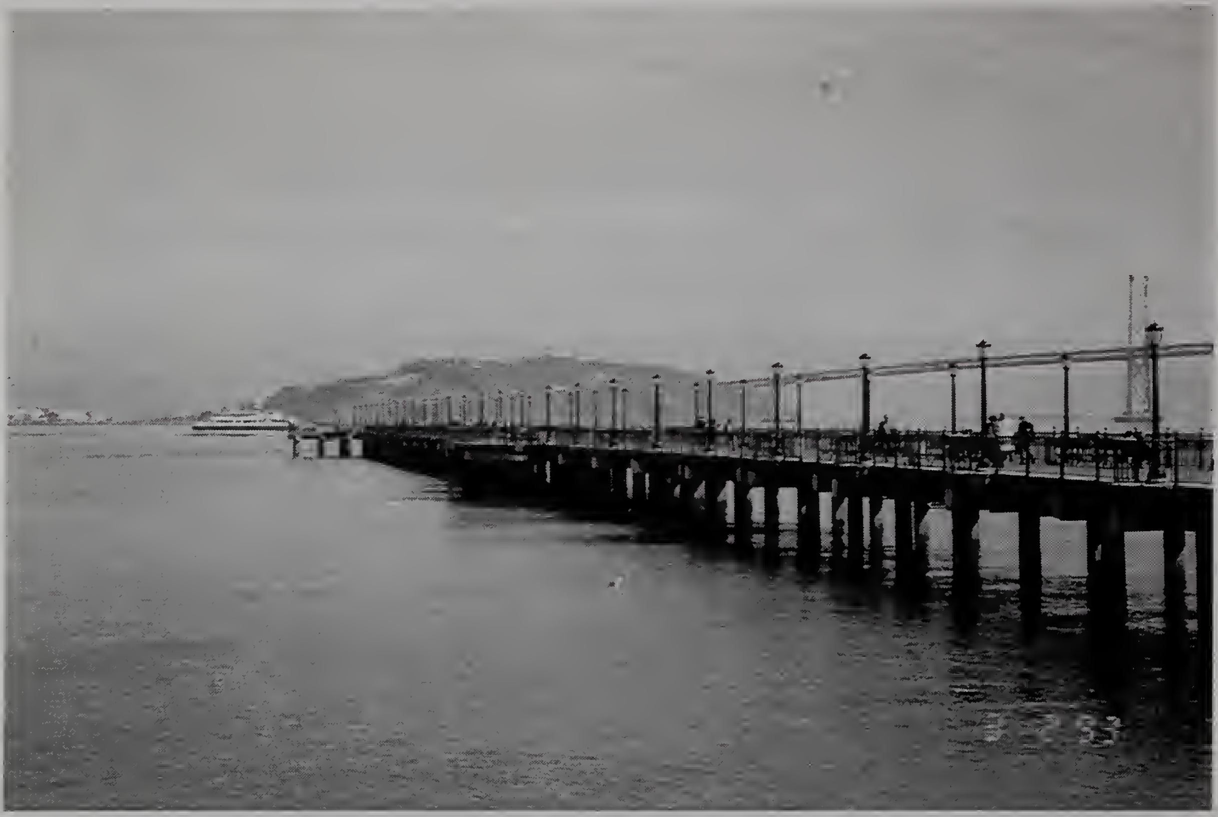

Photo 7: Pier 7

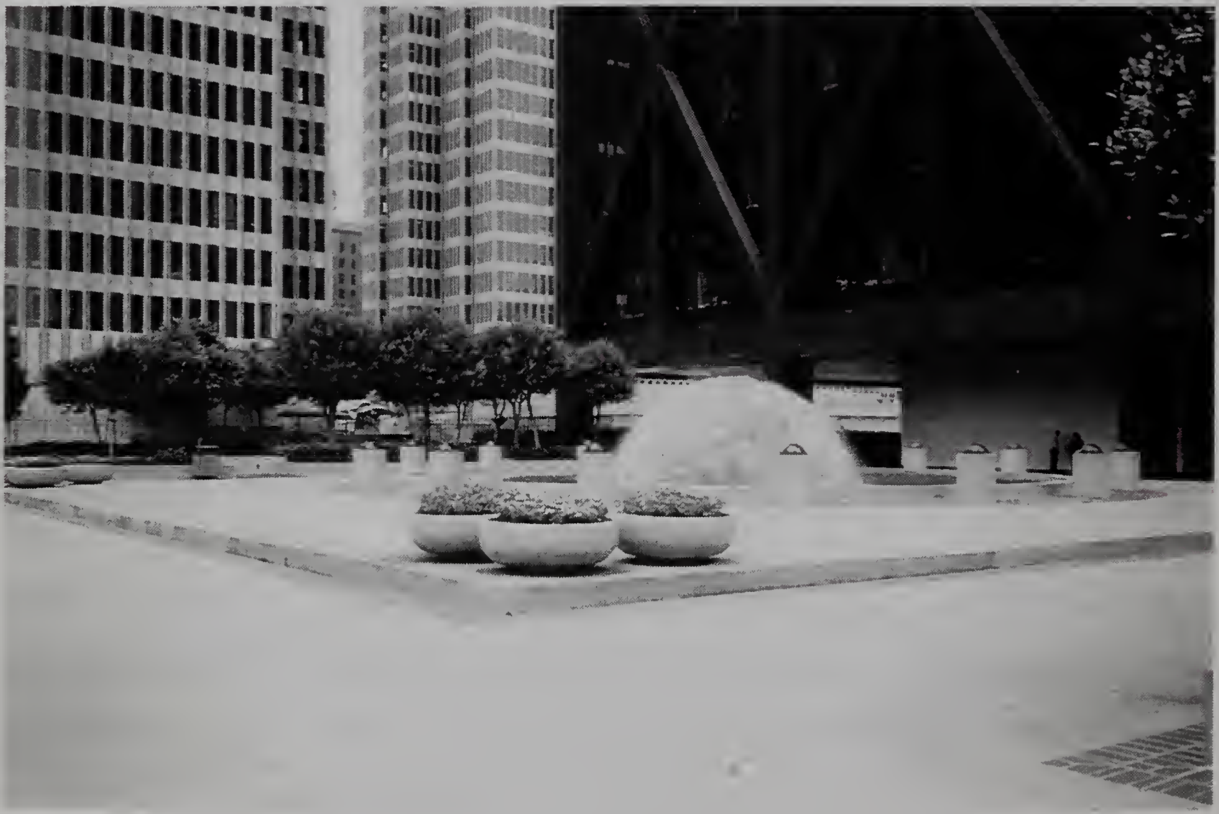

Photo 8: Maritime Plaza

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Terminal Separator Structure

Photographs of Pier 7 and Maritime Plaza

Figure 3.6

Source: Public Affairs Management, 1993

pedestrian only walkway) to the east and Front Street to the west and is tucked within the City's downtown office district.

The Plaza is connected to the Embarcadero office building and the Gateway commercial and residential developments via second story walkways over Clay and Washington Streets.[3] The Plaza is used primarily by downtown office workers during breaks and lunchtime hours and by residents in the area.

3.1.8 Piers 1/2 and 3 [4]

Portions of Piers 1/2 and 3 are open for public access. Pier 1/2, which is the north dock of the Ferry Building, contains approximately 279 square meters (3,000 square feet) of public access at the back of an existing parking area associated with the Oakland/Alameda ferry terminal. Pier 3 contains about 930 square meters (10,000 square feet) of public access as well as the old ferry boat the Santa Rosa (approximately 697 square meters [7,500 square feet]), which is open to the public Monday through Saturday. Pier 1, which is situated between Pier 1/2 and Pier 3, does not currently have public access areas but has been identified for future public access (see Section 3.1.9).

The public access on these piers is used by office workers, residents and tourists. The intensity of use varies at each pier but is generally less than other open space areas in the vicinity, such as Justin Herman Plaza and the Embarcadero Promenade.[5]

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[3] Counts of the types and number of users at these parks or public open space areas were not conducted because these parks and open space areas would not be directly or indirectly affected by project alternatives.

[4] Information regarding public access/open space on Piers and Port facilities was compiled from the following sources:

- Paul Osmundson, Port of San Francisco, Development Project Coordinator, Personal Communications, February 22, 1993 and April 22, 1994.
- Review of existing BCDC permits available from the Port of San Francisco, April 13, 1993.
- Field surveys of Pier facilities conducted April & May 1993.

3.1.9 Future/Planned Parks

The study area for the Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure contains several currently planned public parks, open space areas and public recreation amenities. These include Rincon Point Park, Piers 1 and 3 and the Bay Trail. Figure 3.7 depicts the currently planned public parks and open space within the project study area and their relationship to the project corridor.

Rincon Point Park[6]

Rincon Point Park is a planned park of approximately 19 020 square meters (4.7 acres) to be located along the Bay side of The Embarcadero roadway between Howard Street on the north and Harrison Street on the south (see Figures 3.7 and 3.8). Rincon Point Park is planned as part of the Rincon Point/South Beach Redevelopment Plan. The Park is also shown in the Northeast Waterfront Plan, which is an element of the San Francisco Master Plan. The park would be under the jurisdiction of the San Francisco Redevelopment Agency. Other agencies with jurisdiction would include the Port of San Francisco and BCDC. Proposed activities at the park would include playground uses, a tot lot and landscaped grass areas and trees. No estimates of future use are available. The park would

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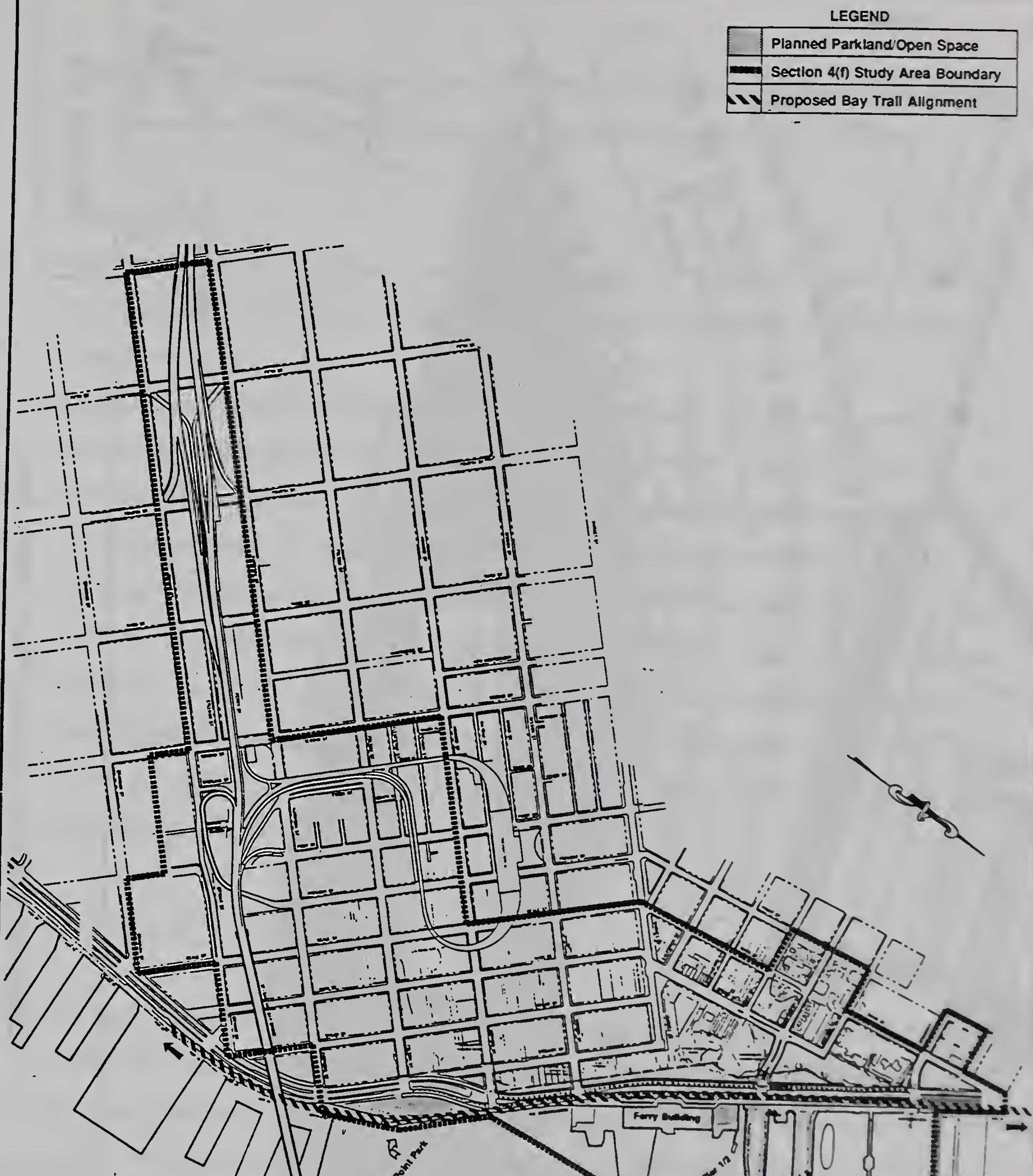
[5] Counts of the types and number of users at these parks or public open space areas were not conducted because these parks and open space areas would not be directly or indirectly affected by project alternatives.

[6] Information regarding Rincon Point Park was obtained from Michael Kaplan, San Francisco Redevelopment Agency, Personal Communication, April 9, 1993.


LEGEND
▨ Planned Parkland/Open Space
Section 4(f) Study Area Boundary
Proposed Bay Trail Alignment
Ferry Building
Pier 1/2
Rincon Point Park
San Francisco Bay

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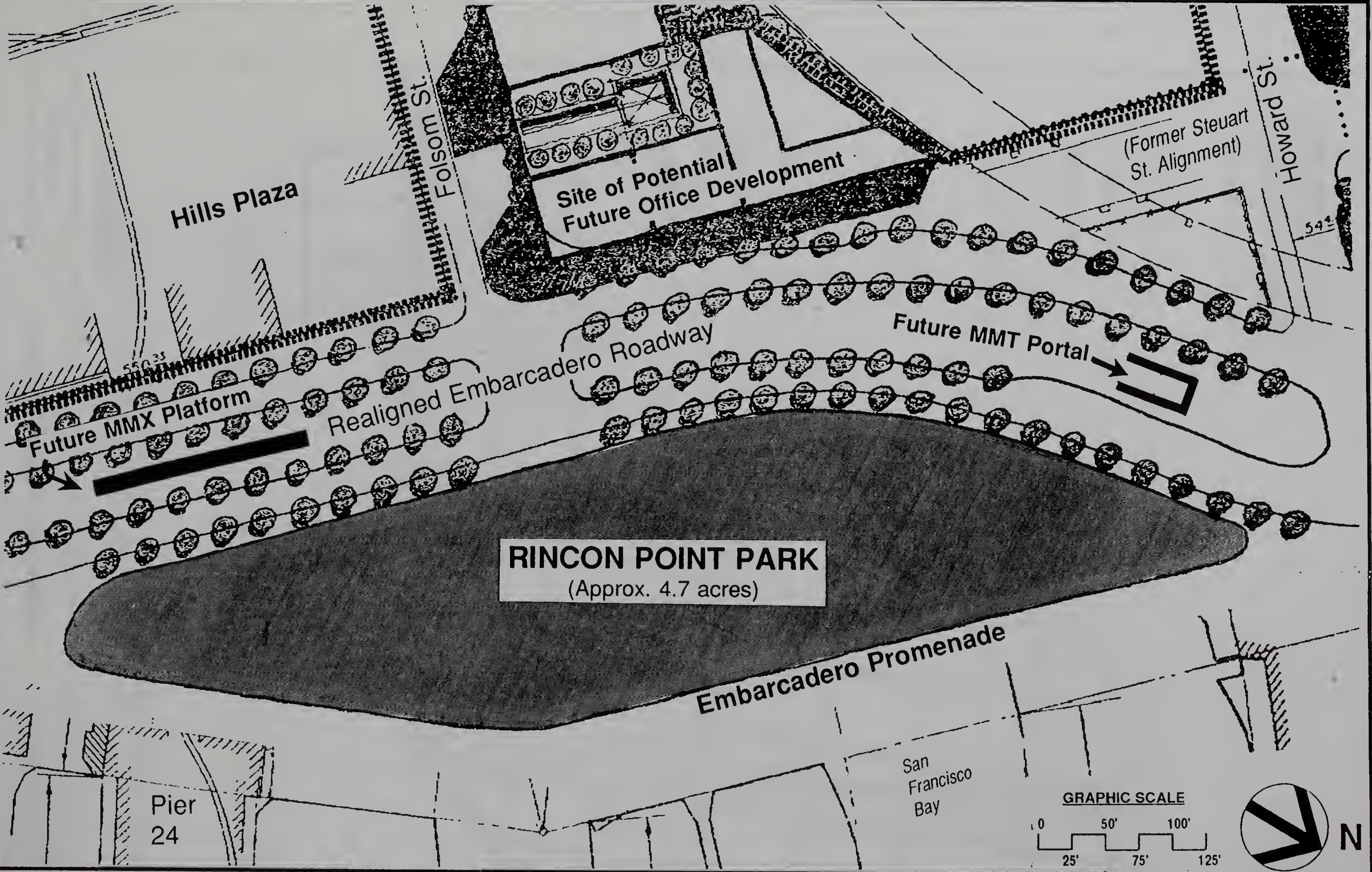
Planned Public Parkland/Open Space

Figure 3.7

Source: Public Affairs Management and Parsons Brinckerhoff, Quade & Douglas Inc. 1993



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Alternatives to Replacement of the
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Detail of Planned Rincon Point Park Area

Figure 3.8

Source: San Francisco Redevelopment Agency, 1993 connect with the existing Embarcadero Promenade and would be separated from existing and future office developments to the west by a realigned Embarcadero roadway.

Piers 1 and 3

Both the Recreation and Open Space and the Northeast Waterfront Elements of the San Francisco Master Plan identify additional open space and public access on and around Piers 1 and 3.

Specific plans for open space and public access on these piers have not been developed by the Port of San Francisco and no estimates of future use are available. However, the Northeast Waterfront Plan identifies continuous public access around the perimeter of Piers 1 and 3 associated with development of the piers themselves. With regard to Pier 1/2, the Northeast Waterfront Plan identifies the provision of public access and circulation through the Pier bulkhead building (see Figure 3.7 and Map 4, p. 11.7.24 of the Northeast Waterfront Plan). Year 2015 land use assumptions contained in the Land Use Background Socioeconomic Report include 2 044 square meters (22,000 sq.ft) of public access on Piers 1 and 3. Other agencies with jurisdiction would include Bay Conservation and Development Commission (BCDC).

Bay Trail[7]

The Bay Trail is a planned multi-purpose trail (walking, bicycling, jogging, etc.) that will encircle all of San Francisco Bay. The project study area includes a portion of the proposed Bay Trail alignment as depicted in the City's Recreation and Open Space Element of the Master Plan and in Figure 3.7. Within the project area, the Bay Trail would utilize the existing and planned portions of the Embarcadero Promenade which are currently under Port of San Francisco jurisdiction. The San Francisco Port Commission, however, has not adopted a specific alignment for the Bay Trail through the project area at this time.

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[7] Information regarding the Bay Trail was obtained from Jill Keimach, Association of Bay Area Government, Bay Trail Project, April 25, 1994.

Specific design details, such as the width of the trail, surface, etc., for the areas within the project area have not been developed. The Bay Trail would be a separate project and may not require any additional amenities other than those planned as part of the North, South and proposed Mid-Embarcadero Roadway projects.

The current plan for the Bay Trail through the Mid-Embarcadero area would consist only of signs along the promenade. Bay trail hikers would be able to use the promenade and bicyclists would be able to use the roadway shoulder. There would not be a separate or additional alignment for the Bay Trail. No projections of user types or numbers were available for these future parks from the Port (Piers 1 and 3), San Francisco Redevelopment Agency (Rincon Point Park), or the Association of Bay Area Governments (Bay Trail).

3.1.10 Non 4(f) Resources

Two areas in the project vicinity were analyzed and determined not to be 4(f) resources. These areas include the Davis Street right-of-way between Clay and Washington Streets, and the office plaza associated with the Bayside Plaza building at the Embarcadero and Howard Streets. These areas, and the reasons they are not considered 4(f) resources, are described below.

Davis Street ROW Between Clay and Washington Streets

The Davis Street right-of-way, between Clay and Washington Streets was closed following construction of the Embarcadero Freeway ramps, which touched-down in the vicinity. The Davis Street right-of-way is still a mapped street, although the San Francisco Recreation and Park Commission was granted revocable permission to occupy the street in 1974 (San Francisco Board of Supervisors Resolution No. 543-74). A negative declaration prepared pursuant to the California Environmental Quality Act in 1974 (case number EE74.59), indicated that plans "acknowledge the proposed future right-of-way for a . . . roadway, in the event the Embarcadero Freeway were demolished." The same document acknowledges that some "landscaping and trees would be lost if this occurred."[8]

The street currently provides landscaped pedestrian access from Clay Street to Washington Street. Alternatives Three and Five would open this section of Davis Street to vehicular traffic, resulting in the loss of some landscaping and trees. Pedestrian access would be maintained. As currently designed, the project would add an equivalent amount of open space adjacent to Justin Herman Plaza and the Embarcadero roadway.

Office Plaza at the Bayside Plaza Building

The paved plaza in front of the Bayside Plaza office building at the intersection of the Embarcadero and Howard Streets is within the right-of-way of the former Embarcadero Freeway. As such, the plaza is publicly owned, although it is leased by the Port of San Francisco to Embarcadero South Investors. The Port lease, dated June 20, 1985, restricts the use of the space "to construct and maintain an urban plaza and public amenity," and "acknowledges and affirms that this License to Use Pace is non-exclusive and is terminable by the Port upon 30 days written notice without reason being required for said termination."[9]

The approximately 6,000 sq. ft. plaza was shaded by the elevated Embarcadero Freeway prior to the freeway's demolition, and is currently adjacent to construction activities associated with the MUNI Metro Turnback and Extension projects. For these reasons, the plaza was/is seldom used by members of the public under both pre-earthquake and existing conditions, except for pedestrian access between the Embarcadero and Howard Street, and pedestrian access to the office building itself. The plaza is completely paved, has a small fountain and seating area, and serves as a plaza entrance to the Bayside Plaza office building.

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[8] Referenced materials are available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street.

[9] Referenced materials are available for public review in the project case file at the San Francisco Planning Department, 1660 Mission Street.

Up to 375 sq. ft. of the office plaza would be used by all build alternatives, and would mostly or entirely be occupied by a 15-foot wide sidewalk, which would continue to provide pedestrian access. (Also see land use discussion in the EIS/EIR.)

3.2 HISTORIC SITES

The following information regarding historic sites within the study area for the Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure is summarized from three technical reports prepared for the project. Historic architectural resources and archaeological resources are summarized from the *Historic Property Survey Report*, *Historic Architectural Survey Report*, and *Archaeological Survey Report*, prepared for the project. These reports are available for review at the San Francisco Department of City Planning, 1660 Mission Street in San Francisco.

The following sections provide a listing of historic sites that are on the National Register of Historic Places, have previously been determined to be eligible for the National Register, or have been determined potentially eligible for the National Register as part of the studies conducted for the project.

3.2.1 Historic Architectural Resources[10]

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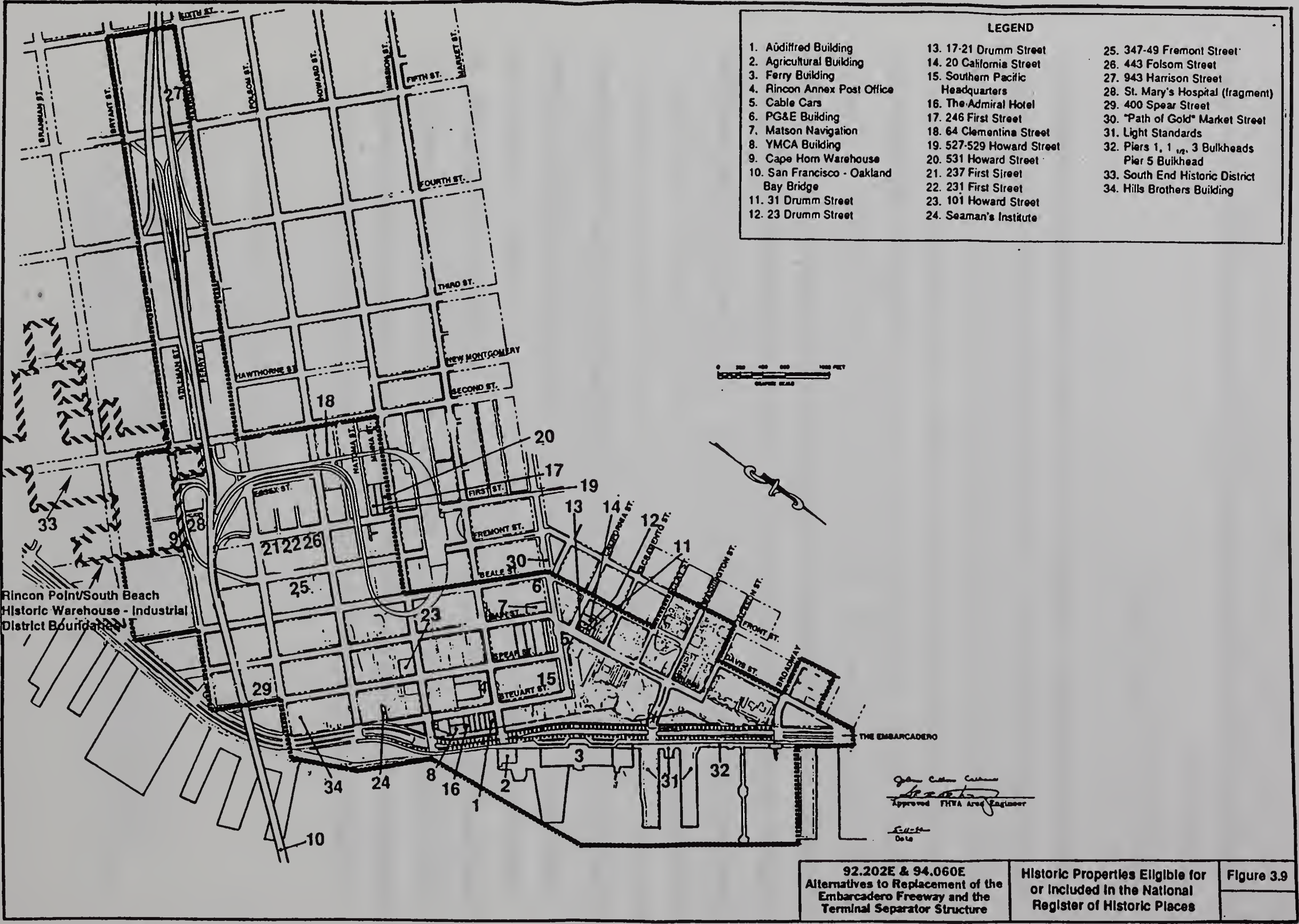
[10] Information regarding Historic Architectural Resources is summarized from the *Historic Architectural Survey Report for the Alternatives for Replacement of the Embarcadero Freeway/Terminal Separator Structure*, prepared by Patrick McGrew Associates, Architects, revised January 20, 1995.

The following historic architectural resources are located within the Section 4(f) study area (see Figure 3.9).

Resources on the National Register

Audiffred Building (Date Listed NR: 5-10-79): The Audiffred Building, located at 1-21 The Embarcadero at the corner of Mission Street, is a four-story structure designed by Hipolyte d'Audiffred and constructed in 1889 (Figure 3.9, Reference No. 1). The ground floor of this building houses the Boulevard restaurant. This building is the only remaining structure located on The Embarcadero roadway along the landward side that survived the 1906 earthquake and fire. The building has a distinctive mansard roof and decorative brickwork. The building's facade is composed of repetitive glazed bays at the first floor, paired windows set in a brick wall at the second floor, aligned with paired windows protruding from the mansard roof at the third floor. The building currently houses private offices on the upper floors.

The Ferry Station Post Office (Agriculture Building) (Date Listed NR: 12-1-78): Located at 101 The Embarcadero south of the Ferry Building and east of The Embarcadero roadway, the Agriculture Building was built as a U.S. Post Office in 1914-15 and transferred to the U.S. Department of Agriculture about 1930 (Figure 3.9 Reference No. 2). The building was designed by A. A. Pyle of the State Department of Engineering. The building is a modified palazzo with Renaissance ornamentation of Mediterranean style. The building is owned by the Port of San Francisco and houses private offices.



LEGEND

1. Audiffred Building
2. Agricultural Building
3. Ferry Building
4. Rincon Annex Post Office
5. Cable Cars
6. PG&E Building
7. Matson Navigation
8. YMCA Building
9. Cape Horn Warehouse
10. San Francisco - Oakland Bay Bridge
11. 31 Drumm Street
12. 23 Drumm Street
13. 17-21 Drumm Street
14. 20 California Street
15. Southern Pacific Headquarters
16. The Admiral Hotel
17. 246 First Street
18. 64 Clementina Street
19. 527-529 Howard Street
20. 531 Howard Street
21. 237 First Street
22. 231 First Street
23. 101 Howard Street
24. Seaman's Institute
25. 347-49 Fremont Street
26. 443 Folsom Street
27. 943 Harrison Street
28. St. Mary's Hospital (fragment)
29. 400 Spear Street
30. "Path of Gold" Market Street
31. Light Standards
32. Piers 1, 1 1/2, 3 Bulkheads Pier 5 Bulkhead
33. South End Historic District
34. Hills Brothers Building

92.202E & 94.060E Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure	Historic Properties Eligible for or Included in the National Register of Historic Places	Figure 3.9

Source: Public Affairs Management

Union Depot and Ferry House (Ferry Building) (Date Listed NR: 12-1-78): The Ferry Building is located at the foot of Mission Street along the east side (Bay side) of The Embarcadero roadway (Figure 3.9 Reference No. 3). The Ferry Building was constructed between 1894 and 1898, served as San Francisco's ferry terminal, and housed Port and State offices. Its designer, A. Page Brown, was one of the City's most important pre-earthquake and fire architects. The Ferry Building survived the 1906 earthquake and fire, and was remodeled after ferry service ended in 1958. The Ferry Building is owned by the Port of San Francisco, which has its offices located within the building. The Ferry Building also houses numerous private businesses and the Golden Gate ferry terminal as well as other ferry service providers such as the Oakland/Alameda ferry, the Red & White ferry service, and the Blue & Gold ferry service all located at Pier 1/2.

Rincon Annex Post Office (Date Listed NR: 11-16-79): The Rincon Annex Post Office is located on Mission Street between Steuart and Spear Streets (Figure 3.9 Reference No. 4). Designed by Gilbert Stanley Underwood and built in 1940, the Rincon Annex is a superb example of Works Projects Administration Modern style of architecture. The interior features murals depicting scenes from California history. The building is currently the centerpiece of the Rincon Point-South Beach Redevelopment Project and has been renovated to provide an arcade of shops, restaurants, a fountain, and a high-rise apartment/condominium complex.

Cable Cars (Date Listed NR: 10-15-66): A cable car turnaround is located at the foot of California Street at Market Street (Figure 3.9 Reference No. 5). The cable car system was listed on the National Register as a National Historic Landmark in 1966. The cable car system is owned and operated by the San Francisco Municipal Railway (Muni) and is a major tourist attraction in the City.

PG & E Building (Date Listed NR: 1-25-92): The PG & E Building is located at 245 Market Street (Figure 3.9 Reference No. 6). This building was constructed in 1925 and is considered a major downtown landmark. The building was built for the Pacific Gas and Electric Company, which continues to occupy the building.

Matson Navigation Building (Date Listed NR: 1-25-92): The Matson Navigation Building is located at 205-231 Market Street (Figure 3.9 Reference No. 7). This building was constructed in 1921 and is next to the PG & E Building. Together they form a fine pair of old office buildings along the Market Street corridor. This building also houses offices for the Pacific Gas and Electric Company.

Resources Previously Determined Eligible for the National Register

Army and Navy YMCA Building (Embarcadero YMCA): The Embarcadero YMCA building covers the width of the block from The Embarcadero to Steuart Street on the first two floors (Figure 3.9 Reference No. 8). In its higher elevations it is divided into two wings, each eight stories, paralleling The Embarcadero. The rear five-story handball court addition was demolished recently and replaced with a three-story steel frame structure fronting on Steuart Street. The entry wing, facing The Embarcadero, is the hallmark of the structure with a brick facade, arched windows and ornate balconies and decorative concrete crests. Nine pairs of windows stretch across the front of the building, and again at the eighth floor. Both have arched windows and balconies. A typical Renaissance feature is the ten-story-high arcade tower, with tiled roof which tops the center portion of the building. There are some Italian Gothic and Moorish design features which make this building an example in the tradition of eclecticism. The YMCA Building is privately owned and houses a hotel, the Embarcadero YMCA, and a restaurant.

Cape Horn Warehouse: The Cape Horn Warehouse located at 540 First Street was built in 1907 (Figure 3.9 Reference No. 9). This warehouse was determined eligible for the National Register in 1982

Hills Brothers Building: Located at 2 Harrison Street, the Hills Brothers Building was designed by architect George Kelhan and constructed in 1918 (figure 3.9 Reference No. 34). The remaining historic building is a rectangular masonry mass, five stories tall, with an adjacent 175 foot tall masonry campanile element which was used as a gravity tower for mixing and roasting coffee beans. The complex also features Romanesque arches at the ground floor, which give way to a free-standing masonry arcade. The building's current eligibility is under review by the State Office of Historic Preservation.

San Francisco/Oakland Bay Bridge: The San Francisco/Oakland Bay Bridge was constructed between May 1933 and November 1936 (figure 3.9 Reference No. 10). The bridge consists of two structures joined by a tunnel through Yerba Buena Island in the middle. The west crossing, between San Francisco and Yerba Buena Island, consists of two suspension bridges anchored in the center to a concrete pier. The design is unique in bridge construction.

Resources Determined Eligible for the National Register as Part of the Section 106 Process

The following historic architectural resources are located within the Section 4(f) study area and have been determined by John Snyder (Snyder) as part of the I-280 Transfer Concept Program[11] or Patrick McGrew Associates Architects (PMAA), as part of the historic architectural survey conducted for this project, to appear eligible for the National Register (see Figure 3.9 for the location of these buildings within the Section 4(f) Study Area).

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[11] John Snyder, *Historic Property Survey Report I-280 Transfer Concept Program*, August 1983.

Figure 3.9

Reference Historic Architectural Resource

No. 11 Benoit Building, 31-35 Drumm Street appears to meet Register criterion A at the local level, (PMAA) Assessor's Block 235-005.

No. 14 Marvin Building, 20 California Street appears to meet register criterion A at the local level, (PMAA) Assessor's Block 0235-009.

No. 15 Southern Pacific Headquarters Building, #1 Market Street, appears to meet register criteria A, B, and C at the local or state level, (Snyder) Assessor's Block 3713-006.

No. 16 The Admiral Hotel, 155 Steuart Street appears to meet Register criterion A at the local level, (Snyder), Assessor's Block 3715-006.

No. 17 Phillips & Van Orden Building, 246 First Street, appears to meet Register criteria A and C, at the local level, (PMAA) Assessor's Block 3736-060.

No. 18 Haas Woodworking Building, 64 Clementina Street, appears to meet Register criterion A at the local level (PMAA), Assessor's Block 3736-060.

No. 19 Martin Building, 527-529 Howard Street, appears to meet Register criteria A and C, at the local level, (Snyder), Assessor's Block 3736-008.

No. 20 Mercedes Oil Building, 531 Howard Street, appears to meet Register criteria A and C at the local level, (Snyder), Assessor's Block 3736-112.

Figure 3.9

Reference	Historic Architectural Resource

No. 22 Selby Shot Works (Thomson Machine Works), 231 First Street appears to meet Register criterion A at the local level, (PMAA) Assessor's Block 3737-023.

No. 23 Folger Coffee Company, 101 Howard Street, appears to meet Register criteria B and C at the local level, (Snyder) Assessor's Block 3740-001.

No. 25 Edwin W. Tucker Co. Building (Walker Engraving), 347-49 Fremont Street appears to meet Register criteria A and C at the local level, (PMAA) Assessor's Block 3740-009.

No. 26 Wilbert Tool Manufacturing Shop (Klockar's Blacksmith Shop), 443 Folsom Street appears to meet Register criterion A at the local level, (PMAA) Assessor's Block 3748-028.

No. 27 Caterpiller Showroom, 943 Harrison Street appears to meet Register criterion C, at the local level, (PMAA) Assessor's Block 3760-081.

No. 29 Rincon Point Warehouse (Hathaway's Warehouse), 400 Spear Street, appears to meet Register criteria A and C, at the local level, (Snyder) Assessor's Block 3768-014.

No. 30 "Path of Gold" Market Street lights standards, appear to meet Register criteria A and C at the local level, (PMAA) (There is no Block and lot for this resource).

Figure 3.9

Reference	Historic Architectural Resource

No. 31 1, 1 1/2, 3 Bulkheads, along The Embarcadero, appear to meet Register criterion C at the local level, (Snyder) (There is no Block and lot for this resource).

No. 32 Pier 5 Bulkhead along The Embarcadero appears to meet Register criterion C at the local level, (Snyder) (There is no Block and lot for this resource).

No. 33 Rincon Point/South Beach Historic Warehouse - Industrial District (with boundaries similar to the locally designated South End Historic District) appears to meet National Register criteria A, B, C, and D at the state level (Snyder)

(No Number) The former Key Line Substation building located at Sterling, Harrison, and Rincon Streets is associated with the historic train service on the San Francisco/Oakland Bay Bridge, which has previously been determined eligible for the National Register.

Descriptions of these historic architectural resources are contained in the *Historic Architectural Survey Report for the Replacement Alternatives for the Embarcadero Freeway/Terminal Separator Structure Project* prepared by Patrick McGrew Associates June 18, 1994 which is available for public review at the San Francisco Department of City Planning, 1660 Mission Street in San Francisco.

The Jackson Square Historic District is outside the 4(f) study area. Two local historic districts (Northeast Waterfront and the South End) are partially within the study area. When the Northeast Waterfront district was evaluated for National Register eligibility as part of an earlier study, it was determined that the boundaries of the National Register eligible district are smaller than the local district, and thus falls outside the current study area.[12] Seven structures of the locally-designated South End historic district are within the Section 4(f) study area. Eight structures in the district have been determined eligible for National Register listing. One of the structures which is eligible for National Register listing, the Cape Horn Warehouse at 540 First Street is within the Section 4(f) study area. The other buildings within the South End historic district are referenced in Appendix III of the *Historic Architecture Survey Report* for the project.

3.2.3 Archaeological Resources[13]

Review of archival sources indicate that a broad range of potential archaeological resources may be present along all the Terminal Separator Structure/ Mid-Embarcadero Roadway Project APE. They vary in type, degree of potential integrity, and potential significance as expressed by potential eligibility for the National Register of Historic Places. A brief summary of each potential resource is provided below. These resources are also depicted on Figure 3.10.

Prehistoric Period (Before A.D. 1770)

One potential archaeological resource, CA-SFr-2, was previously recorded at Third and Harrison Streets and appears to be an "intact" habitation site with shell midden, artifacts, and burials. In addition, it is possible, previously undocumented prehistoric sites may be present anywhere in the Project area that had been dry land or marshy shallows in prehistoric times.

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[12] City and County of San Francisco, Department of Public Works, Bureau of Engineering, *Historic Properties Survey Report and Request for Determination of Effect*, for the Embarcadero Surface Roadway Project, San Francisco, August 1990.

[13] Information regarding Archaeological Resources is summarized from the *Archaeological Survey Report for Alternatives for the Replacement of the Embarcadero Freeway/Terminal Separator Structure* prepared by Holman and Associates, revised January 27, 1995.

KEY
* = not spotted on Figure 6.2
Northern Segment:
- * = Old Sea Wall (1867-1870s)
- * = New Sea Wall (1878-1924)
- * = Undocumented Residences:Northern Segment
- * = Undocumented Commercial Sites: Northern Segment
- * = Undocumented Small Factories: Northern Segment
- 1 = Ships at Folsom and Steuart/Hare's Ship-Breaking Operation (1850s)
- 2 = Ship A?
- 3 = Fill on Washington Street at Front (1850s)
- 4 = Fill on N. Side of Folsom betw. Beale and Main (1850s)
- * = Fill:Northern Segment (1860s-1880s)

Block 1 (Assessor's Block 3718)
5 = Ship C

Block 2 (Assessor's Block 3739)
[2 = Ship A?]
6 = Ship B
7 = Ship D

Block 4 (Assessor's Block 3737)
8 = Western Foundry at 234 Fremont (1880s-1906)
9 = Golden State Miners Ironworks at 251 First (1860-1906)
10 = Miners Hotel/Shops (1855-1906)
11 = Domestic/Commercial sites at 404-408 Folsom/242-248 Fremont (1860s-1906)
12 = Domestic Sites at 238 Fremont and on Baldwin Ct. (1880s-1906)

Block 7 (Assessor's Block 3764)
13 = Domestic sites at 469-479 Harrison Street (1870s-1906)
Domestic sites at 413 Second Street (1870s-1906)

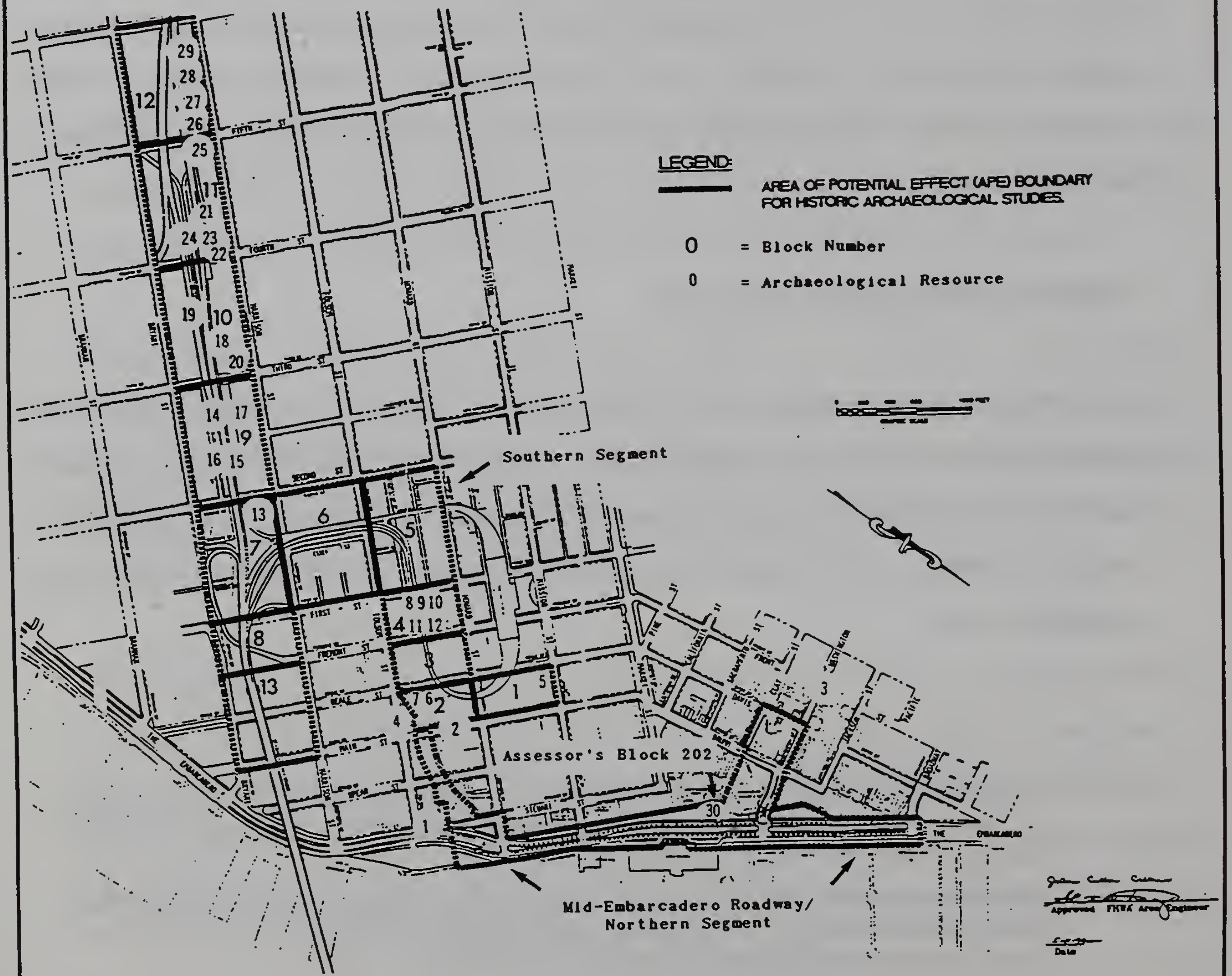
Block 9 (Assessor's Block 3763)
14 = Silver Street Kindergarten (1878-1906)
15 = Domestic sites along Perry Street (1870s-1906)
16 = Domestic Sites along Silver Street (1870s-1906)
17 = Prehistoric CA-SFr-2?

Block 10 (Assessor's Block 3762)
18 = Domestic sites along Perry Street (1870s-1906)
19 = Domestic Sites along Silver Street (1870s-1906)
20 = Prehistoric CA-SFr-2?

Block 11 (Assessor's Block 3761)
21 = Residences at 202-256, 203-269 Perry Street (1870s?/1880s-1906)
22 = Residences/Stores at 415-422, 424-430 Fourth Street (1870s?/1880s-1906)
Store and Saloon at 422 Fourth Street (1870s?/1880s-1906)
23 = Store and Saloon at 223 Perry Street (1880s-1906)
Chinese Laundry at 220 Perry Street (1880s)
Dewey Furniture Factory at 221-223 Perry Street (1880s-1906)
24 = New 4th Street Hotel at 205 Perry Street (1870s?-1906)
25 = Residences/Stores at 407-417 Fifth Street (1870s?/1880s-1906)
Store and Saloon at 413 Fifth Street (1870s?/1880s-1906)

Block 12 (Assessor's Block 3760)
26 = Residences at 404-416 Fifth Street, Stores at 410-412 Fifth Street (1870s?/1880s-1906)
Milk Depot at 408 Fifth Street (1890s-1906)
Wood and Coal Yard at 404 Fifth Street (1870s?/1880s-1906)
27 = Residences at 10-18, 5-17 Madison Avenue (1870s?/1880s-1906)
28 = Residences at 7-17,10-20 Oak Grove Avenue (1870s?/1880s-1906)
29 = Residences at 9-23, 10-24 Morris Avenue (1870s?/1880s-1906)

Assessor's Block 202/203
30 = The Elizabeth
* = Undocumented Residences
Undocumented Commercial Sites
Fill



92.202E & 94.060E Alternatives to Replacement of the Embarcdero Freeway and the Terminal Separator Structure	*Archaeological Resources*	Figure 3.10

Source: An Archaeological Survey Report for the Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure, January 27, 1995

Any such prehistoric site would have high potential research value and might be eligible for the National Register of Historic Places under Criterion D, depending on its integrity.

Spanish/Mexican/Early American Period (Ca. 1770-1848)

Much of the Project APE remained under water during the Spanish/Mexican/Early American Periods, and the area of Rincon Hill is not known to have been occupied or extensively used during these periods. No known buried hulks or other artifacts are known to have been recovered from or near the Project APE from this period of historic occupation of San Francisco. However, it is remotely possible that stray artifacts were discarded or lost on Rincon Hill or during boat transit across Yerba Buena Cove. It is also remotely possible that unrecorded sunken small boats from this period may be present at undetermined locations. If present, such resources would be of some interest to historic archaeologists. However, the eligibility of such small craft for nomination to the National Register of Historic Places is undetermined at this time

Gold Rush/Late 19th Century (1848-1906)

Archival research indicates that a number of buried archaeological resources may be located within the project APE. The types of resources that may be present include: storeships and other hulks; buried wharves; the Sea Walls; buried debris from industrial sites; building remains and debris from commercial buildings and sites; buried remains and debris from domestic/residential sites; buried remains and debris from institutions; and artifacts and other refuse contained in historic fill deposits. Each of these categories of potential archaeological resources are listed below with a brief description of their potential significance under National Register criteria.

Buried Storeships and Other Hulks

- The Cordova (1850s)
- The Garnet (1850s)
- The Alida (1850s)
- The Bethel (1850s)
- The Elizabeth (1850s) (Assessor's Block 202)
- Ships at Folsom and Stuart Street/Hare's Shipbreaking Operation (1850s)
- Ship B (1850s-ca.1857) (Block 2; Assessor's Block 3739)
- Storeship C (1850s-post 1864) (Block 1; Assessor's Block 3718)
- Ship D (1850s) (Block 2; Assessor's Block 3739)

Evaluation of the potential significance of buried ships' hulks depends on their condition and history. All scuttled ships had been stripped of cargo and fittings prior to sinking, yet several such buried ships in San Francisco have been judged eligible for nomination to and placed on the National Register of Historic Places.

The Seawalls

- The Old Sea Wall (1867-1870s)
- The New Sea Wall (1878-1924)

Both the Old Sea Wall and the New Sea Wall (San Francisco Sea Wall) have been determined to be eligible for nomination to the National Register of Historic Places (Gualtieri 1988, CA Archaeological Inventory at Sonoma State 1995).

Industrial Sites

- Life C Watts Shipyard (1850s-ca.1867) (Block 2:Assessor's Block 3739)
- Risdon Ironworks (1868-ca.1899) (Block 2:Assessor's Block 3739)
- Industrial Ironworks (late 1860s-1906) (Block 2:Assessor's Block 3739)
- Western Foundry (1880s-1906) (Block 4:Assessor's Block 3737)
- Golden State Miners' Ironworks (1860-1906) (Block 4:Assessor's Block 3737)
- Chinese Cigar Box Factory at 626 Bryant Street (1870s?/1880s-1906) (Block 11:Assessor's Block 3761)
- West Coast Furniture Factory 456-493 Fourth Street (1870s?/1880s -1906)(Block 11:Assessor's Block 3761)
- Weston Basket Factory at 652-654 Bryant Street (1890s-1906) (Block 11:Assessor's Block 3761)
- Blacksmith/Cooper/Furniture shops at 658, 658 1/2 Bryant Street (1870s?/1880s-1906)(Block 11:Assessor's Block 3761)
- Western Matza Company at 433 Sixth Street (1880s-1906)(Block 12: Assessor's Block 3760)
- Sonoma Preserve Company at 424-426 1/2 Fifth Street (1880s-1906) (Block 12:Assessor's Block 3760)
- Reed Pickle Factory at 718-718 1/2 Bryant Street (1890s-1906) (Block 12:Assessor's Block 3760).
- Undocumented Small Factories in Assessor's Block 202/203
- Undocumented Small Factories in Mid-Embarcadero Area

These sites, if they display integrity, would likely be eligible for nomination to the National Register of Historic Places under Criterion D, under the theme of Industrialization and innovation. Several, such as the Risdon Ironworks may also qualify under Criterion A as a reflection of early settlement and industry in San Francisco. The Watts Shipyard might qualify for nomination to the National Register of Historic Places under Criteria A and D as an example of an early workshop during the Gold Rush that might shed light on boat building and repairs conducted during the first years of that city. The eligibility of the smaller workshops and factories is uncertain at this time.

Commercial Buildings/Sites

- Domestic/Commercial Buildings and Outbuildings at 308, 308 1/2 Folsom (1870s-1906) (Block 3:Assessor's Block 3738)
- Domestic/Commercial Buildings and Outbuildings at 310 and 312 Folsom (1880s-1906) (Block 3:Assessor's Block 3738))
- Miners' Hotel and Surrounding Shops 261 and 263 First, 432-418 Folsom (1855-1906) (Block 4:Assessor's Block 3737)
- Domestic/Commercial Buildings at Corner of Folsom and Fremont 404-408 Folsom, 242-248 Fremont (1860s-1906) (Block 4:Assessor's Block 3737)
- Rincon House 268-272 First (1854-1906) (Block 5:Assessor's Block 3736)
- Shops with Residences 256-266 First (1870s-1906) (Block 5:Assessor's Block 3736)
- Stores at 405-422, 424-430 Fourth Street (1870s?/1880s-1906) (Block 11:Assessor's Block 3761)
- Saloons at 400,404,and 422 Fourth Street (1880s?/1890s-1906) (Block 11:Assessor's Block 3761)
- Saloons at 401, 413, 449 Fifth Street (1880s?/1890s-1906) (Block 11:Assessor's Block 3761)

- The New 4th Street Hotel at 203-205 Perry Street (1870s?/1880s-1906) (Block 11:Assessor's Block 3761)
- Chinese Laundries at 807 Harrison Street (1880s)(Block 11:Assessor's

Block 3761)

- Chinese Laundry at 817 Harrison Street (1890s-1906)(Block 11: Assessor's Block 3761)
- Chinese Laundry at 220 Perry Street (1880s)(Block 11:Assessor's Block 3761)
- Chinese Laundry at 421 Fifth Street (1880s)(Block 11:Assessor's Block 3761)
- Western Transfer & Storage Company's Stables at 837 Harrison Street (1890s-1906)(Block 11:Assessor's Block 3761)
- Stetson Renner Drayage Company's Stables /Rode and Company's Truck Stables at 423-435 Fifth Street (1890s-1906)(Block 11:Assessor's Block 3761)
- Wood and Coal Store rear of 855-857 Harrison Street (1890s-1906) (Block 11:Assessor's Block 3761)
- Cobbler's Residence at 923-923 1/2 Harrison Street (1890s-1906) (Block 12:Assessor's Block 3760)
- Saloons at 400-402, 422, and 448 Fifth Street (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Saloons and stores at 910, 955, 971,973-975 Harrison Street (1870s?/1880s-1906)(Block 12:Assessor's Block 3760)
- Saloon and Store at 762-764 Bryant Street (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)

- Saloon and Store at 445 Sixth Street (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Stores at 404, 408-414, 440-444 Fifth Street (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Stores at 907-913 and 917 Harrison Street (1870s?/1880s-1906)

(Block 12:Assessor's Block 3760)

- Stores at 403-405, 431,, 435-443 Sixth Street (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Drug Store at 401 Sixth Street (1870s?/1880s-1906)(Block 12: Assessor's Block 3760)
- Wood and Coal Yard at 404 Fifth Street (1880s-1906)(Block 12: Assessor's Block 3760)
- Wood and Coal Yard at 5 Oak Grove Avenue (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Hay Barn at 430 Fifth Street (1880s-1906)(Block 12:Assessor's Block 3760)
- Hay Barn at 413 Sixth Street (1890s-1906)(Block 12:Assessor's Block 3760)
- Milk Depot at 408 Fifth Street (1890s-1906)(Block 12:Assessor's Block 3760)
- Undocumented Commercial sites on Assessor's Block 202/203
- Undocumented Commercial Sites in Mid-Embarcadero Area

Commercial sites would most likely meet Criterion D for eligibility for nomination to the National register of Historic Places. Domestic and commercial sites tend to overlap or are coincident. Shops frequently occur on the ground floor over which lodging or rooms were located. Owners or workers of commercial enterprises frequently lived on the premises or above them. Thus refuse, trash pits, privies, etc. of commercial establishments may be next to, overlap or be mixed with habitation refuse and deposits. The data that might be associated with the Chinese laundries might qualify as documentation of this significant ethnic group. As most of the Project Area burned in the 1906 fire, contents of commercial establishments may survive in sufficient amounts and integrity to permit research

Domestic/Residential Buildings

- Life C. Watts Shipyard (1850s-ca.1867) (Block 2:Assessor's Block 3739)
- Domestic/Commercial Buildings and Outbuildings at 308 and 308 1/2 Folsom (1870s-1906) (Block 3:Assessor's Block 3738)
- Domestic/Commercial Buildings at 310 and 312 Folsom (1880s-1906) (Block 3:Assessor's Block 3738)
- Rental Units at 314-324, 243-239 Folsom, 1-3 Lincoln (1880s-1906) (Block 3:Assessor's Block 3738)
- Miners' Hotel 261 First and Surrounding Shops 263 First, 432-418 Folsom (1855-1906) (Block 4:Assessor's Block 3737)
- Domestic/Commercial Buildings at Corner of Folsom and Fremont, 404-408 Folsom, and 242-248 Fremont (1860s-1906) (Block 4:Assessor's Block 3737)
- Domestic Buildings at 238 Fremont and on Baldwin Court (1880s-1906) (Block 4:Assessor's Block 3737)
- Rincon House 268-272 First (1854-1906) (Block 5:Assessor's Block 3736)
- Shops with Residences 256-266 First (1870s-1906) (Block 5:Assessor's Block 3736)
- Residence at 518 Folsom (1857-1906) (Block 5:Assessor's Block 3736)
- Outbuilding Associated with Carriage House at 34 Essex (1880s-1906) (Block 6:Assessor's Block 3749)
- Dwellings on Perry Street (1870s-1906) (Block 9:Assessor's Block 3763)
- Structure near Fifth Street (1850s) (Block 11:Assessor's Block 3761)
- Residences at 807-33, 834-857 Harrison Street (1870s?-1906)(Block 11:Assessor's Block 3761)
- Residences at 202-218, 228-244 1/2, 250-258 Perry Street (1870s-1906)

(Block 11:Assessor's Block 3761)

- Residences at 207-217, 223-257 Perry Street (1870s-1906)(Block 11: Assessor's Block 3761)
- Residences at 404-409, 413-417, 441-447 Fifth Street (1870s?/1880s -1906) (Block 11:Assessor's Block 3761)
- Residences at 570-586 Bryant Street (1870s?/1880s-1906)(Block 11: Assessor's Block 3761)
- Structure (Early 1850s)(Block 12:Assessor's Block 3760)
- The Russ House(?) (1850s-1860s)(Block 12:Assessor's Block 3760)
- Building on Sixth Street near Harrison Street (late 1850s)(Block 12: Assessor's Block 3760)
- Two Buildings on Bryant Street between Fifth and Oak Grove Avenue (1850s)(Block 12:Assessor's Block 3760)
- Building in Mid-Block (1850s)(Block 12:Assessor's Block 3760)
- Building on Harrison Street near Fifth Street (1850s)(Block 12: Assessor's Block 3760)
- Residence at 750 Bryant Street (late 1850s?-1906)(Block 12: Assessor's Block 3760)
- Residences and lodgings above stores at 400-418,416-428,432-446 Fifth Street (1860s(?)1880s-1906)(Block 12:Assessor's Block 3760)
- Residences at 3-36 and 5-39 1/2 Madison Avenue (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Residences at 7-37 1/2 and 6-34 Oak Grove Avenue (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Residences at 3-57 Morris Avenue (1870s?/1880s-1906)(Block 12: Assessor's Block 3760)
- Residences at 6-60 Morris Avenue (1870s?/1880s-1906)(Block 12: Assessor's Block 3760)

- Residences at 905-915, 921-985 Harrison Street (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Residences at 702-716, 720-772 Bryant Street (1870s?/1880s-1906) (Block 12:Assessor's Block 3760)
- Residences at 401-405, 419-431, 437-445 Sixth Street (1870s?/ 1880s-1906)(Block 12:Assessor's Block 3760)
- Undocumented Residential Areas on Assessor's Block 202/203
- Undocumented Residential Areas in Mid-Embarcadero Area

As with commercial contexts, domestic sites are frequently mixed or next to commercial sites so that refuse, features and contents of burned structures may be mixed. Discrete, intact deposits such as refuse pits, privies, contents of buildings, etc. would best serve to address research questions. As most of the Project area burned in the 1906 fire, contents of residences may survive and yield sufficient, discrete data to address the questions. Eligibility for nomination to the National Register of Historic Places would most likely address Criterion D.

Institutions

- St. Mary's Hospital (1861-1906) (Block 7:Assessor's Block 3764)
- Silver Street Kindergarten (1878-1906) (Block 9:Assessor's Block 3763)
- Mizpah Presbyterian Church at 859 Harrison Street (1890s-1906) (Block 11:Assessor's Block 3761)

The hospital and school were significant to the history of San Francisco and refuse deposits and remains of structures would be amenable to archaeological study. For example, architectural remains, artifacts associated with specific individuals, and artifacts representative of occupants may survive at the site of St. Mary's Hospital. Such deposits might qualify under Criterion D for eligibility for nomination to the National Register of Historic Places.

Fill Artifacts

- Assessor's Blocks 202/203 (1880s-1890s)
- Washington Street at Front Street (1850s)
- North Side of Folsom Street between Main and Beale Streets (1850s)
- Mid-Embarcadero Area (1860s-1880s+)

Fill materials generally may be expected to be ineligible for the National Register. However, discrete deposits may be identifiable whose provenance, or at least social or ethnic origin is identifiable that may have more potential significance. These would have to be determined on a case by case basis.

The cultural resources identified above are described in detail in the *Archaeological Survey Report* prepared for the Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure. That Archaeological Survey Report relies heavily on documents prepared by Caltrans analyzing the area of the Terminal Separator Structure. The eligibility of these resources for inclusion on the National Register has not been determined unless otherwise indicated above. In all likelihood, any resources that are found during construction and determined eligible for the National Register would be important only in terms of data recovery, and would not warrant preservation in place. Section 4(f) only applies to archaeological sites if they are on or eligible for the National Register and if they warrant preservation in place.

4. IMPACTS AND MEASURES TO MINIMIZE HARM

4.1 INTRODUCTION

The following section discusses the potential "use" of the Section 4(f) resources discussed in Section 3, for each project alternative. According to Federal Highway Administration policy, "use" of a Section 4(f) property occurs when land is permanently incorporated into a transportation facility, when temporary occupancy does not meet conditions of 23 CFR 771.135(p)((7), or when there is constructive use of land (e.g., severe proximity impacts such as noise, air quality, visual impacts). When a particular alternative would involve use of a 4(f) property, measures to minimize harm to the 4(f) resources, as well as avoidance alternatives, are discussed.

All build alternatives would use Assessor's Block 202 for construction of a below grade parking garage if the project were to compensate the Port of San Francisco for revenue loss due to parking displacement as described in the impacts section of the EIS/EIR. All permanent above ground features associated with the garage would be outside of areas under the jurisdiction of the San Francisco Recreation and Park Department.

As originally designed, Alternative 5 would result in use of an existing Section 4(f) resource, because portions of Justin Herman Plaza would be incorporated into the transportation facility; redesign of Alternative 5 to avoid this 4(f) resource is described as a mitigation measure below.

None of the project alternatives would result in constructive use of an existing Section 4(f) resource. Under pre-earthquake and existing conditions, all Section 4(f) resources were/are located in close proximity to local roadways and transportation facilities. None of the project alternatives would substantially alter the proximity of these roadways and transportation facilities to existing and future Section 4(f) resources, and none would constrain their use.

Because the proposed project examines alternatives to replacement of the Embarcadero Freeway and the Terminal Separator Structure, the evaluation of potential impacts of each project alternative compares the proposed project alternatives to 1989 pre-earthquake conditions, as well as to existing conditions. In 1989, an elevated freeway structure (the Embarcadero Freeway) connected the Bay Bridge with the Washington Street/Clay Street and Broadway Street corridors. The elevated freeway structure consisted of a double-deck freeway traversing the study area above The Embarcadero roadway. With regard to Section 4(f) resources in the project area, the elevated freeway structure detracted from the usability and character of these resources.

4.2 PUBLICLY-OWNED PARKS

This section describes the potential impacts of the project alternatives on publicly-owned parks within the project study area. Permanent impacts on existing and proposed parks and open space areas are discussed first and followed by analysis of temporary, construction period impacts.

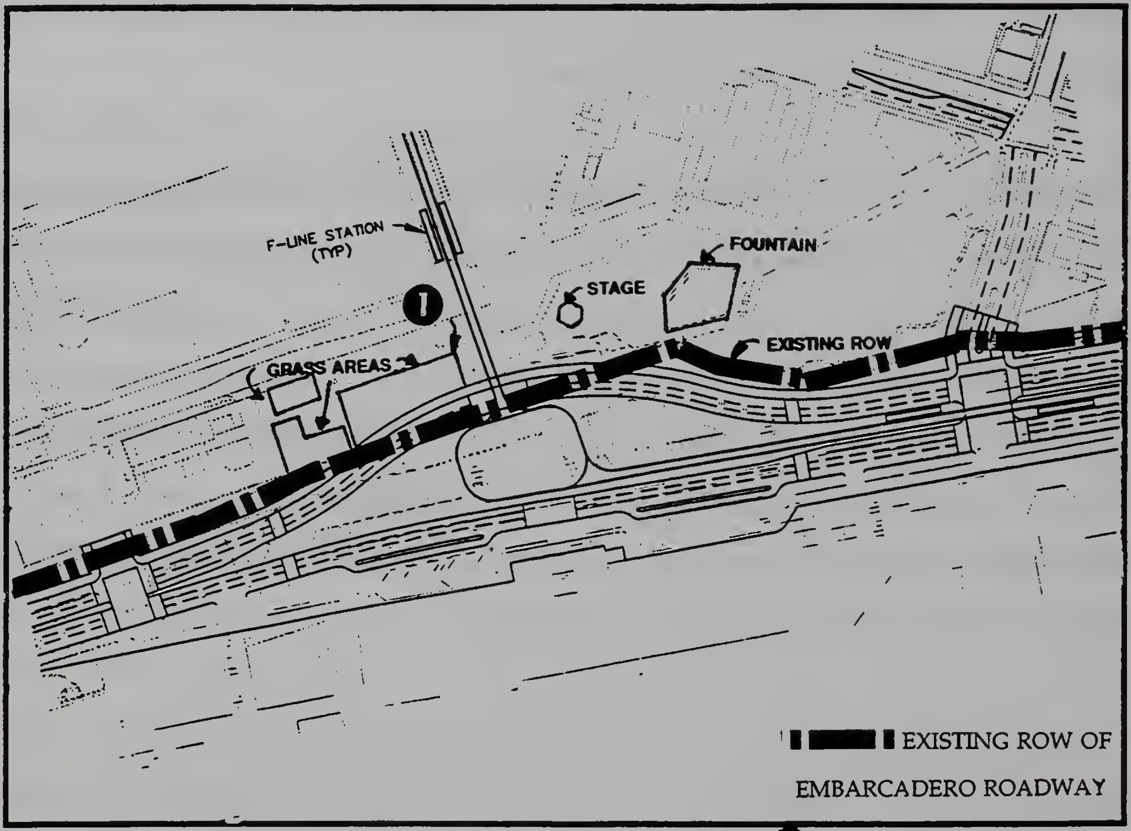
4.2.1 Justin Herman Plaza

When compared to pre-earthquake conditions, all project alternatives would replace the elevated Embarcadero Freeway which was located in close proximity to Justin Herman Plaza with a surface roadway. This would be considered a beneficial effect on Justin Herman Plaza by removing the Embarcadero Freeway structure which cast shadows over portions of the Plaza in the morning hours and detracted from the visual setting of the Plaza.

When compared to existing conditions, the No-Build Alternative and Alternatives 2, 3 and 4 would avoid permanent use of Justin Herman Plaza. Alternatives 2, 3 and 4 would be accommodated within the existing public right-of-way. Alternative 5 would result in the use of approximately 0.15 hectare (0.5 acre) of Justin Herman Plaza as a result of the westward realignment of the southbound lanes. The realignment of the pre-earthquake southbound lanes would remove a portion of the raised landscaped areas in Sub-area B, a portion of the walkway from Market Street to the Ferry Building, and a portion of the raised landscaped area between the plaza and the existing roadway in Sub-area A of the plaza (see Figures 3.2, 3.3 and 4.1). However, access to and from the Plaza would not be altered as a result of Alternative 5. In the absence of mitigation, the impact on the existing Plaza resulting from Alternative 5 would be considered significant given the intensity of users. Alternative 5 however, would also free up approximately 0.4 hectares (1.1 acres) of area in the middle of The Embarcadero roadway (between the Market Street terminus and the Ferry Building) for future uses (while the current project would not designate this space for a specific use, the space would represent a net increase of 0.2 hectares (0.6 acres) of available land which could be used for public open space).

Alternatives 2, 3 and 4 would make available additional space along the Plaza's eastern edge as a result of an eastward realignment of the pre-earthquake southbound travel lanes. A small triangular piece of open land would also be created adjacent to Block 202 between Washington Street and Justin Herman Plaza. (see Figure 4.2). The disposition of the open land created adjacent to Justin Herman Plaza and Block 202 would be determined as part of the Urban Design Plan being developed for the Mid-Embarcadero area. If the Urban Design Plan is not finalized by the completion of a preferred alternative, the City would maintain these areas as paved or grassy open spaces.

View looking southeast at the lawn area of Justin Herman Plaza


F-LINE STATION (TYP)
1
FOUNTAIN
STAGE
EXISTING ROW
GRASS AREAS
EXISTING ROW OF EMBARCADERO ROADWAY
1 LOCATION AND DIRECTION OF PHOTOGRAPH

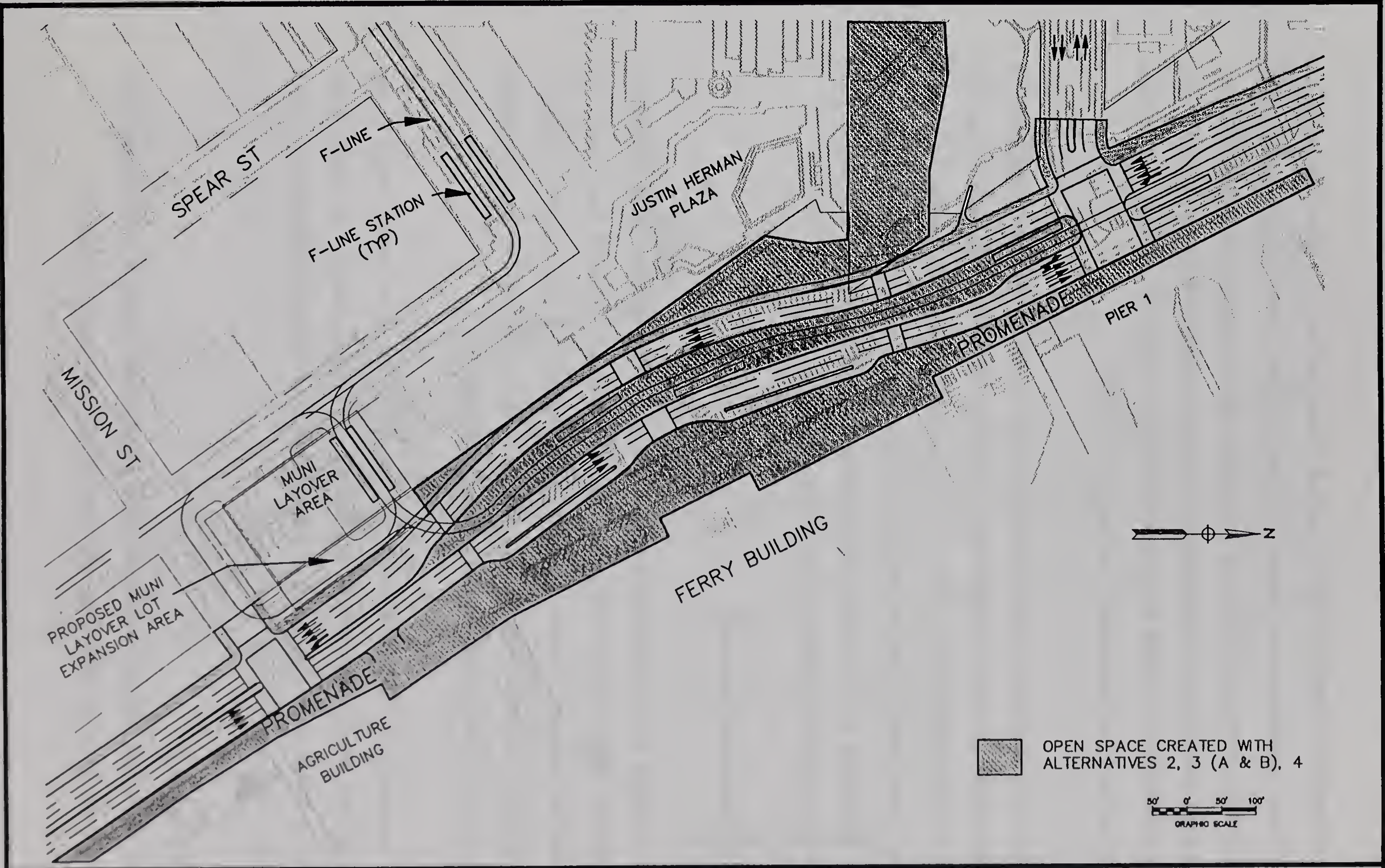
Schematic - No Scale

92.202E & 94.060E
Alternatives to Replacement of the
Embarcadero Freeway and the
Terminal Separator Structure

Land Required from
Justin Herman Plaza
Under Alternative 5

Figure 4.1

Source: Parsons, Brinckerhoff, Quade & Douglas



92.202E & 94.060E
ALTERNATIVES TO REPLACEMENT
OF THE EMBARCADERO FREEWAY
AND THE TERMINAL
SEPARATOR STRUCTURE

Alternatives 2, 3 (Options A and B) and 4
Pedestrian Areas and Open Space Opportunites

Figure 4.2

Source: San Francisco Department of Public Works. Finger and Moy Architects

A minor amount of grading would be needed to even out any elevation differences and provide easy pedestrian access between the parallel parking spaces along the southbound roadway and the landscaped areas and paved areas and pathways of Justin Herman Plaza. These slight modifications would not have an impact on the use of Justin Herman Plaza. Under Alternatives 2, 3 and 4, the general relationship between the roadway and the Plaza would not change, so there would be no Section 4(f) impact.

Use of Justin Herman Plaza under Alternative 5 would be avoided by slightly realigning the proposed roadway so that its western curb abutted but did not encroach on the plaza (see Figure 4.3 for Mitigated Alternative 5). The sidewalk along the western side of the roadway would transition and become part of the plaza as the roadway swings to the west. While eliminating the 4(f) impact, this realignment would have other potential impacts similar to the original Alternative 5, and to Alternative 3.

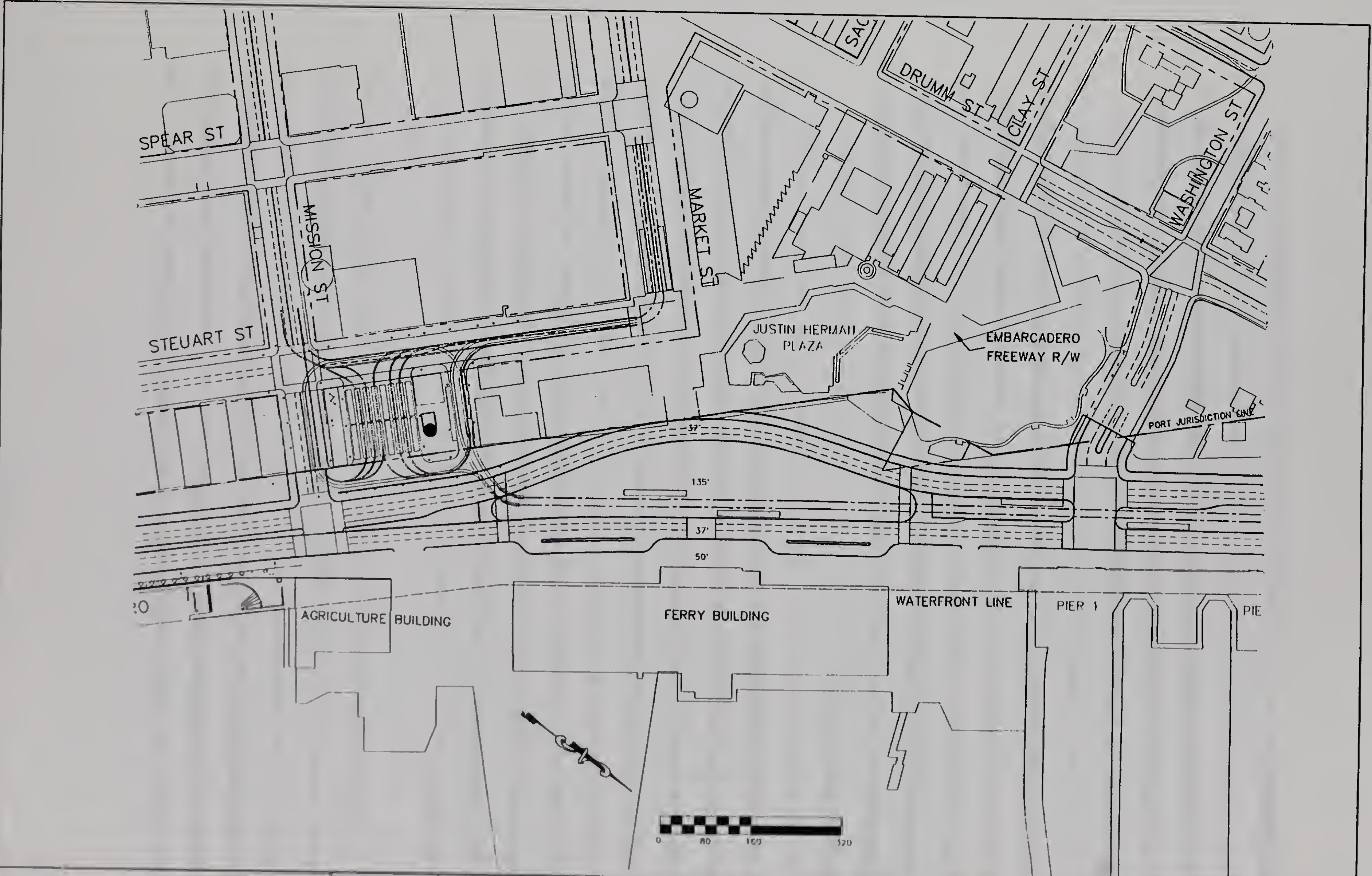
4.2.2 Embarcadero Promenade

When compared to pre-earthquake conditions, all project alternatives would replace the Embarcadero Freeway with a surface roadway. This change would be beneficial to the Embarcadero Promenade because the elevated freeway structure was in close proximity to the Promenade and cast a shadow on a portion of the existing Embarcadero Promenade (between Howard and Mission Streets) for much of the day.

When compared to existing conditions, no project alternatives would result in the permanent use of the Embarcadero Promenade. All project alternatives would either maintain or widen the existing width of the Embarcadero Promenade which is currently 3.8 meters (12.5 feet) wide in most locations.

4.2.3 Ferry Plaza

None of the project alternatives would result in a Section 4(f) impact on Ferry Plaza, which is located east of the Ferry Building, sufficiently away from the project corridor.



92.202E & 94.060E
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure

Mitigated Alternative 5

Figure 4.3

Source: Parsons, Brinckerhoff, Quade & Douglas, Inc. and Public Affairs Management, 1994

4.2.4 Block 202

None of the project alternatives would re-build the Washington Street and Clay Street ramps of the Embarcadero Freeway, and when compared to pre-earthquake conditions, non-recreational features located on Block 202 would be reduced under all alternatives.

When compared to existing conditions, none of the roadway improvements would result in the use of Block 202, since they would be accommodated within the existing Embarcadero right-of-way. All alternatives would, however, result in the use of Block 202 for construction of an underground parking structure if that parking structure is approved and constructed in order to compensate the Port for the loss of revenue from parking areas that would be displaced from the Embarcadero median.

As discussed in the EIS/EIR and in the background report regarding socioeconomic and land use issues, all project alternatives would result in the net loss of between 339 and 371 parking spaces (depending on which alternative is selected) under the jurisdiction of the Port of San Francisco. In addition to inconveniencing individuals who currently use those parking spaces, this parking displacement would result in a loss of revenue for the Port. As required by Federal right-of-way rules, the project would compensate the Port for revenue loss due to parking displacement, either through construction of an underground parking structure of up to 340 spaces beneath Block 202 and adjacent portions of Washington Street, or by direct monetary compensation.

If compensation takes the form of construction of a replacement parking facility, the only feasible location for that facility within the vicinity would be beneath Block 202. Sites on the Bay-side of the Embarcadero are under the jurisdiction of the Bay Conservation and Development Commission (BCDC), and both the BCDC and the City have policies that restrict parking over or along the water. On the land-side of the Embarcadero, most sites are fully built-out, or are under the jurisdiction of the Recreation and Park Department. The only other possible site is MUNI's layover yard at Mission Street and the Embarcadero, which MUNI has indicated is unavailable, since it will continue to be needed as a layover facility, and because its removal could severely affect transit service in the vicinity. Also, the MUNI site, as well as portions of the Embarcadero roadway itself, are located above sub-grade transit and utility structures that would make subsurface development extremely difficult or infeasible. Potential sites outside of the immediate vicinity have been rejected by the Port and are not prudent, since they would not serve Port tenants and facilities to the extent of the existing parking that would be displaced.

To minimize the loss of facilities on Block 202 during construction, an efficient construction schedule would be developed in coordination with staff of the Recreation and Park Department, and would be implemented during construction of the underground parking structure, if approved. Also, following construction, all above ground features of the garage (i.e. ramps, elevators, vents) would be located outside of areas under the jurisdiction of the Recreation and Park Department, and the surface of Block 202 would be returned to its current use. Coordination with staff of the Recreation and Park Department would occur regarding planning and development of the replacement facilities on top of the garage.

As part of the land use assumptions for the Alternatives to the Replacement of the Embarcadero Freeway and Terminal Separator Structure, future office development was assumed on a portion of Block 202 by the year 2015. The future development of Block 202 is not part of the current project, and would require separate approval actions and environmental analysis.

4.2.5 Block 203

Under the pre-earthquake conditions, the Washington Street and Clay Street ramps to the levated Embarcadero Freeway occupied most of Block 203, limiting its recreational potential. None of the project alternatives would replace these ramps, and when compared to pre-earthquake conditions, non-recreational features located on Block 203 would be reduced under all alternatives.

When compared to existing conditions, none of the project alternatives would result in the use of Block 203, which is located at a sufficient distance away from the proposed improvements. Therefore, no Section 4(f) impact would occur.

As part of the land use assumptions for the Alternatives to the Replacement of the Embarcadero Freeway and Terminal Separator Structure, future office development was assumed on Block 203 by the year 2015. The future development of Block 203 is not part of the current project, and would require separate approval actions and environmental analysis.

4.2.6 Maritime Plaza

None of the project alternatives would result in the use of Maritime Plaza. Because the Plaza is two blocks from any future roadway alignment, no Section 4(f) impact would occur to this resource.

4.2.7 Piers 1/2, 3 and 7

None of the project alternatives would result in the permanent use of Piers 1/2, 3, and 7. All project Alternatives would either maintain the existing eastern edge of The Embarcadero roadway or increase the width of the Embarcadero Promenade. Therefore, no Section 4(f) impact would occur to these piers.

4.2.8 Future Parks: Rincon Point Park, Piers 1 and 3 and the Bay Trail

Piers 1 and 3, or the Bay Trail. Therefore, no Section 4(f) impact would occur to these planned facilities.

Rincon Point Park will be located south of Howard Street, along the east side of The Embarcadero (see Figure 3.8). Under all build alternatives, consistent with City plans and policies, the northbound lanes of The Embarcadero roadway would be realigned, in order to create Rincon Point Park.

None of the project Alternatives would impact the planned public open space around Piers 1 and 3 or the planned Bay Trail because under all project alternatives the existing eastern edge of the Embarcadero roadway would be maintained or would be relocated away from Bay-side facilities. Under the build alternatives, the Embarcadero Promenade would be either maintained at its existing width of 3.8 meters (12.5 feet) or widened (see Section 4.2.2).

4.2.9 Construction Period Impacts On Public Park Land and Open Space[14]

Temporary construction impacts would occur on adjacent public park land and open space under all build alternatives. Construction-period impacts would include elevated noise levels from the use of earth moving equipment, trucks and other equipment (pile driving would not occur in the vicinity of 4(f) resources), and air quality impacts; access to and from parks and open space would change. Construction period impacts are discussed in more detail in the *Socioeconomic/Land Use/Growth Inducement Background Report* prepared for the project.

Although the temporary construction period impacts to Section 4(f) resources are not considered significant, the following measures would minimize harm to the public parks and open space in the vicinity of the project.

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[14] Preliminary staged construction, Mid-Embarcadero Roadway Replacement Project, January 1993.

To minimize harm to public parks and open space along the project alignment, fences would be erected around areas under construction. Contractors would be required to comply with the City Noise Ordinance and with air quality mitigation measures to reduce dust and emissions. Access to and from all parks and open space would be maintained.

Under the City's Noise Ordinance (San Francisco Police Code Article 2900), noise created from construction equipment is not allowed to exceed 80 dBA at a distance of 100 feet from the source unless a special permit is authorized by the Director of Public Works. Impact tools (e.g. jackhammers) must have both intake and exhaust muffled to the satisfaction of the Department of Public Works. Section 2908 of the Ordinance limits noise generating construction activities to the hours between 8:00 P.M. and 7:00 A.M. These requirements would limit temporary noise impacts associated with construction activities. (For additional discussion of project generated noise and construction period noise, see the background Noise Report prepared for this project.)

General construction period air quality mitigation measures would include: sprinkling the site with water during excavation and construction activities; sprinkling unpaved construction areas with water twice daily; covering stock piles of soil, sand, and other material; and sweeping surrounding streets during excavation and construction at least once per day to reduce particulate (dust) emissions. Construction equipment would also be maintained in good working order to minimize exhaust emissions. These requirements would limit air quality impacts of construction.

4.3 HISTORIC SITES

The following section describes the potential impacts of the project alternatives on historic sites within the project study area.

4.3.1 Historic Architectural Resources[15]

When compared to pre-earthquake conditions, all project alternatives would enhance views of historic architectural resources along the project alignment and improve their overall setting. The elevated freeway created a visual barrier within the project area which affected the setting of historic structures along The Embarcadero. A surface roadway would allow greater visual access and would be more in character with the surrounding uses and historic structures than the former Embarcadero Freeway.

While the proposed alternatives would alter off-street parking conditions in the vicinity, and could change some vehicular access patterns, none of the project alternatives would result in the use (permanent, temporary or constructive) of a historic architectural resource which is on the National Register or eligible for inclusion on the National Register. Alternatives 2, 3, 4 and 5 can be accommodated within the existing right-of-way (or adjacent open space, in the case of Alternative 5), and the right-of-way does not contain any historic architectural resources.

Historic architectural resources adjacent to areas where construction activities would occur (the Embarcadero YMCA Building; the Audiffred Building; the Agriculture Building; the Ferry Building; the Admiral Hotel; Seaman's Institute, Pier 1-5 Bulkheads, Thomson Machine Works, 231 First Street, 237 First Street, 242 Fremont Street, and 443 Folsom Street) could be indirectly affected by construction activities including: construction period noise; increased dust levels; and temporary alteration of vehicle and pedestrian access. No historic architectural resource would be adversely affected by pile driving because these activities would occur at locations sufficiently distant from these resources.

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[15] Evaluation of impacts to historic architectural resources is based on the *Historic Architectural Survey Report* (revised January 20, 1995) prepared by Patrick McGrew Associates and the *Historic Property Survey Report* (dated January 1995) prepared by Public Affairs Management for the Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure Project.

Construction-related noise can affect historic architectural resources. Increased noise levels diminish the attractiveness of these resources' setting, as well as disrupt workers in these structures. Construction activities would increase noise levels in the project area during construction periods. The duration of construction-period noise impacts to a specific historic resource would vary at given locations at various times during the course of construction. During construction, noise levels at a given location would vary depending upon the type of equipment being used, its location on the site, and the amount of time that the equipment is operated in its noisiest mode. Construction noise would be required to conform with the City's Noise Ordinance.

Increased dust levels in the atmosphere during project construction could soil and possibly damage the facades of historic architectural resources along the proposed project alignment. If construction dust emissions have an acidic chemical content or a high concentration of lime or concrete, chemical reactions with glazed terra cotta and/or marble surfaces could occur, also potentially damaging to historic building facades. Dust suppression measures would mitigate these potential impacts.

Another potential construction-period impact is the temporary alteration of vehicle and pedestrian traffic patterns. Potential impacts to historic structures could occur if pedestrian access to and from these structures, or at building entry points, is changed substantially. All build alternatives could result in changes and possible restrictions in motor vehicle and pedestrian access during construction, including traffic rerouting and the closure of sidewalks. Delays at key intersections could occur. Regardless of which build alternative is implemented, pedestrian access and entry points to the historic resources would be maintained at all times during project construction.

All of the following recommendations are for the construction period of the proposed project.

Noise: Within San Francisco, construction noise is regulated by the San Francisco Noise Ordinance (Article 29 of the *City Police Code*). The ordinance requires that noise levels of construction equipment, other than impact tools, not exceed 80 dBA at a distance of 30 meters (100 ft.) from the source. Impact tools (jack hammers, pile drivers, impact wrenches) must have both intake and exhaust muffled to the satisfaction of the Director of Public Works. Section 2908 of the ordinance prohibits construction work at night, from 8:00 p.m. to 7:00 a.m., if noise would exceed the ambient noise level by five dBA at the project property line, unless a special permit is authorized by the Director of Public Works.

The general contractor would pre-drill holes for piles (if feasible based on soils) and minimize noise and vibration from pile driving. The actual pounding from pile driving could occur during a five-to-eight minute span per pile.

Implementation of the City's noise ordinance, required by law, would reduce potential noise impacts to generally acceptable levels. Additional detail is provided in the Noise Report prepared for this project.

Dust Suppression: The general contractor shall be required to sprinkle excavation sites with water continuously during excavation activity; sprinkle unpaved construction areas with water at least twice per day to reduce dust generation by about 50 percent; cover stockpiles of soil, sand and other such materials; cover trucks hauling debris, soil, sand and other such materials; and sweep streets surrounding excavation and construction sites at least once per day to reduce particulate emissions. The general contractor would be required to obtain reclaimed water from the Clean Water Enterprise for this purpose, as required under City of San Francisco Ordinance No. 175-91. The general contractor would also be required to maintain and operate construction equipment so as to minimize exhaust emissions of particulate and other pollutants, by such means as prohibition of idling motors when equipment is not in use or when trucks are waiting in queues, and implementation of specific maintenance programs (to reduce emissions) for equipment that would be in frequent use for much of the construction period. Additional detail is provided in the Air Quality Report prepared for this project.

4.3.2 Archaeological Resources[16]

Potential primary impacts to buried archaeological resources could occur throughout the proposed project alignment from several project-related activities: 1) impacts resulting from construction of piers and supports of elevated ramps associated with Alternatives 3 and 5 (New Peninsula access ramps (Second and Fourth Street) and reconstruction of the Fremont Street ramp) and with Alternative 4 (reconstruction of the Fremont Street ramp); 2) installation of associated utility or drainage improvements; 3) impacts from removal or grubbing out of existing below-grade remnants of formerly elevated Embarcadero Freeway segments and feeders; and 4) construction of subsurface parking on Block 202, proposed as possible compensation for the economic impacts associated with the loss of parking. All of these would involve subsurface excavation that could impact or damage potentially significant archaeological resources within the project APE. Potential secondary impacts would result from unauthorized artifact or bottle digging or looting by construction workers or unauthorized individuals, during construction, often posing as archaeologists. Such activities could threaten potential historic assemblages along the project APE.

There is a high probability that any resources that are found during construction and are determined eligible for the National Register would be important only in terms of data recovery, and would not warrant preservation in place. Section 4(f) only applies to archaeological sites if they are on or eligible for the National Register and if they warrant preservation in place.

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[16] Evaluation of impacts to archaeological resources is based on the *Archaeological Survey Report* prepared for the Alternatives to Replacement of the Embarcadero Freeway and Terminal Separator Structure Project, by Holman and Associates, revised January 27, 1995.

This summary of possible impacts to potential archaeological resources refers only to buried, debris, artifacts, remnants, and features associated with the resource. It is anticipated that none of these resources are represented by any standing architectural element or remnant above ground.

Alternative 1: No Build

Because this alternative essentially maintains the existing street network and ramp connections, no impact on archaeological resources would occur.

Alternative 2: Mid-Embarcadero Roadway

This alternative would result in reconstruction of The Embarcadero between Folsom Street and Broadway. No construction or reconstruction of ramps would occur under this alternative. Reconstruction of The Embarcadero roadway would not involve substantial excavation and would disrupt only the upper several feet of fill along The Embarcadero which would not contain cultural material. However, some sub-surface excavation up to 8 feet deep is anticipated as part of installation of utilities. Therefore, some potential archaeological resources along the Embarcadero corridor.

Alternative 3: Mid-Embarcadero Roadway & New Peninsula Access Ramps (Options A & B)

This alternative would require the construction of access ramps and reconstruction of the Fremont Street ramp. This construction would involve excavation activities which could impact cultural material. Modification of the Fremont Street ramps could affect the resources on Block 4 (Assessor's Block 3737). Also, as with Alternative 2, some sub-surface excavation up to 8 feet deep is anticipated as part of installation of utilities along the portion of The Embarcadero between Folsom Street and Broadway. This would potentially threaten resources, as discussed under Alternative 2.

In addition to Block 4, construction of the Peninsula access ramps in Option A could affect resources on Block 7 (Assessor's Block 3764), Block 9 (Assessor's Block 3763), Block 10 (Assessor's Block 3762), Block 11 (Assessor's 3761), and Block 12 (Assessor's Block 3760).

In addition to Block 4, Option B would involve construction of the Peninsula access which could affect resources on Block 7 (Assessor's Block 3764), Block 9 (Assessor's Block 3763), Block 10 (Assessor's Block 3762), Block 11 (Assessor's 3761), and Block 12 (Assessor's Block 3760).

Alternative 4: Straight Mid-Embarcadero Roadway & Traffic Modifications

This alternative would require the reconstruction of the Fremont Street ramp. This construction would involve excavation activities which could impact cultural material within Block 4 (Assessor's Block 3737), as discussed under Alternative 3. Also, as with Alternative 2, some sub-surface excavation up to 8 feet deep is anticipated as part of installation of utilities along the portion of The Embarcadero between Folsom Street and Broadway. This would potentially threaten resources, as discussed under Alternative 2.

Alternative 5: Curved Mid-Embarcadero Roadway & New Peninsula Access Ramps (Options A & B)

This alternative would require the construction of access ramps and reconstruction of the Fremont Street ramp. This construction would involve excavation activities which could impact cultural material. Realignment of The Embarcadero roadway would not involve substantial excavation and would disrupt only the upper several feet of fill along The Embarcadero which would not contain cultural material. However, some sub-surface excavation up to 8 feet deep is anticipated as part of installation of utilities. Therefore, this alternative may threaten resources in the Mid-Embarcadero area, as described under Alternative 2.

Reconstruction of the Fremont Street ramps could affect the resources within Block 4 (Assessor's Block 3737) as discussed under Alternative 3.

Options A and B would include some sub-surface excavation for the reconstruction of access ramps. Option A could potentially impact resources located in Block 7 (Assessor's Block 3764), Block 9 (Assessor's Block 3763), Block 10 (Assessor's Block 3762), Block 11 (Assessor's Block 3761), and Block 12 (Assessor's Block 3760) as described for Alternative 3. Option 3 could also potentially impact resources on Block 7,9,10,11 and 12 as described under Alternative 3.

Possible Underground Parking Structure Option

A subsurface parking structure may be constructed on Assessor's Block 202 and adjacent portions of Washington Street in order to compensate the Port of San Francisco for revenue loss due to parking displacement. Construction of a subsurface parking structure in this location could result in significant impacts to archaeological resources including The Elizabeth, unknown ships, undocumented domestic buildings/sites, undocumented commercial buildings/sites, and fill from the City Building Period.

Measures to Minimize Harm

The following measures are excerpted from the *Historic Property Survey Report and Finding of Effect for the Alternatives to Replacement of the Embarcadero Freeway and Terminal Structure, San Francisco, CA, September, 1994.* Research and investigation methodologies will be described in a memorandum of agreement with the Advisory Council on Historic Preservation designed to meet requirements of Section 106 of the Historic Preservation Act of 1966.

1. Undertake expanded, detailed archival research on the Northern (Mid-Embarcadero) portion of the Project APE to bring documentation and identification of potential archaeological resources in that area up to the degree of specificity achieved for the

Southern area. This should be undertaken and the results presented in the same block-by-block format employed in the Southern Area. This effort should include the area of the possible Underground Parking Structure Mitigation Option.

2. Formulate and implement a testing/evaluation/data recovery program for indicated archaeological resources.

3. If the subsurface parking structure remediation option on Assessor's Block 202 is selected, formulate a testing/evaluation/data recovery program for archaeological resources on the block. This would include a search for and evaluation of the Elizabeth which might be buried on that block.

4. An archaeological monitoring program should be formulated and implemented during construction, related drilling, or excavation for all locations.

5. Formulate and implement a program of health and safety procedures for monitoring and testing/evaluation procedures where toxic materials have been identified or are suspected. This program should be developed by a qualified professional. Such procedures may include special training, use of protective clothing or specialized equipment, as well as implementation of specific cautions/procedures.

6. In the event that buried cultural materials are unearthed during site preparation, grading, or construction of the project, work would be halted in the vicinity of the find until a qualified archaeologist can assess its importance.

7. A report of findings resulting from archaeological testing/evaluation/data recovery procedures should be compiled and submitted at the conclusion of field work and analysis.

8. Significant artifacts and samples should be prepared and curated at an appropriate facility after completion of research and report preparation.

9. Proper site security, such as fencing with locked gates, should be provided around construction areas to prevent unauthorized artifact or bottle digging by unauthorized individuals. In addition, construction workers should be instructed on the importance of artifacts uncovered on the site and the need to report such finds in accordance with the archaeological monitoring program.

4.3.3 Avoidance Alternatives

Only Alternative 5 (Options A and B) would result in a Section 4(f) impact by permanently using a portion of Justin Herman Plaza. This 4(f) impact would be mitigated by reconfiguring Alternative 5 (Options A and B) as shown in Figure 4.3. Therefore all alternatives would, with the application of mitigation measures, avoid Section 4(f) impacts.

Project Alternatives 2, 3, 4 and 5 would affect a large number of parking spaces owned and operated by the Port of San Francisco. The Port could be compensated for the revenue loss die to this parking displacement through construction of an underground parking structure, which would result in the temporary use of Assessor's Block 202 during construction of the subsurface garage. The only avoidance alternative for this temporary use, if approved as compensation for the Port's revenue loss, would be the No-Build Alternative.

5. COORDINATION

5.1 PORT OF SAN FRANCISCO

A meeting was held on November 4, 1992 between San Francisco Department of City Planning, Office of Environmental Review, and the Port of San Francisco to elicit the Port's views on the effects of the project on property under the Port's jurisdiction within the study area. The focus of the meeting was to determine year 2015 land use assumptions based on potential future land uses for parcels recently opened up by the demolition of the Embarcadero Freeway as well as future development activities on piers within the study area.

The Port of San Francisco, in a letter dated September 1, 1992, stated that the Ferry Building, Agriculture Building and Piers 1, 1-1/2, 3 and 5 are National Register properties or are eligible for the Register and that the proposed project alternatives should be evaluated as to their potential impact on these historic structures.

The Port of San Francisco was also consulted during the preparation of the 4(f) Evaluation regarding the status and current design of public open space within their jurisdiction, as well as regarding future public open space planned within their jurisdiction.

A letter expressing the Port's concurrence with the findings and conclusions of the 4(f) report dated November 15, 1994 is contained in Appendix C.

5.2 SAN FRANCISCO RECREATION AND PARK DEPARTMENT

A meeting was held on November 4, 1992 between San Francisco Department of City Planing, Office of Environmental Review, and the San Francisco Recreation and Park Department to elicit the Department's views on the effects of the project on property under its jurisdiction. The Recreation and Park Department identified several 4(f) resources to be addressed in this evaluation including: The Embarcadero Promenade; the proposed Rincon Point Park; Justin Herman Plaza; Parcel 202; and Parcel 203.

The Recreation and Park Department also submitted a letter dated September 30, 1992, in response to the public scoping process for the Mid-Embarcadero Roadway Replacement Project. In that letter, the Department requested that the potential impacts of the proposed roadway on existing open space be evaluated and mitigation measures to integrate the roadway with existing open space be included. The Department also requested that the impacts of the proposed roadway on future open space be evaluated. The Department was also consulted during preparation of the 4(f) evaluation regarding open space within their jurisdiction and potential impacts on those areas.

A letter dated November 10, 1994 expressing the Park and Recreation Department's concurrence with the findings and conclusions of the 4(f) report was received and is contained in Appendix C to this report.

5.3 SAN FRANCISCO REDEVELOPMENT AGENCY

The San Francisco Redevelopment Agency was consulted regarding existing and proposed park land and open space within the study area under their jurisdiction. The proposed Rincon Point Park is within the study area and is under the Redevelopment Agency's jurisdiction.

5.4 DEPARTMENT OF THE INTERIOR

The City and County of San Francisco Department of City Planning and the Office of Environmental Review has requested input from the Department of the Interior regarding any lands within the 4(f) study area under their jurisdiction. A letter requesting the Department's input was issued on February 16, 1993. To date, no reply has been received. A copy of the letter is contained in Appendix A.

5.5 DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

The City and County of San Francisco Department of City Planning and the Office of Environmental Review has requested input from the Department of Housing and Urban Development regarding any lands within the 4(f) study area under their jurisdiction. A letter requesting the Department's input was issued on February 16, 1993. To date, no reply has been received. A copy of the letter is contained in Appendix A.

6. REFERENCES/BIBLIOGRAPHY

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Public Affairs Management, *Socioeconomic/Land Use/Growth Inducement Background Report, December 1994.*

APPENDIX A

Letters requesting input from
the U.S. Department of the Interior
and
the U.S. Department of Housing and Urban Development

City and County of San Francisco
Department of City Planning

450 McAllister Street
San Francisco, CA 94102

February 16, 1993

Ms. Patricia Port
Regional Environmental Officer
U.S. Department of the Interior
600 Harrison Street, Suite 515
San Francisco, CA 94107

RE: Mid-Embarcadero Replacement Project

Dear Ms. Port:

The City and County of San Francisco Department of City Planning, Office of Environmental Review is currently preparing a Environmental Impact Statement/Impact Report (EIS/EIR) for the Mid-Embarcadero Replacement Project.

As part of the environmental review process, the City is requesting input from resource agencies and interested parties regarding potential impacts of the project. The City is currently preparing a Section 4(f) Evaluation pursuant to the requirements of the National Environmental Policy Act. As part of this study, information regarding publicly owned parkland and historic sites within the project study area is being requested. A map depicting the project study area is attached.

The City requests that the Department of Interior review the attached map and provide information regarding properties within the Study Area under the jurisdiction of the Department of the Interior. This information will be taken into consideration in conducting the environmental review of the project.

If you have any questions regarding the project please contact me at (415) 558-6384.

Very truly yours,

Hillary Gitelman
Office of Environmental Review

Attachment

HG:pg

City and County of San Francisco
Department of City Planning

450 McAllister Street
San Francisco, CA 94102

February 16, 1993

Mr. John Wilson
Acting Regional Administrator
U.S. Department of Housing and Urban Development
450 Golden Gate Avenue
San Francisco, Ca 94102

RE: Mid-Embarcadero Replacement Project

Dear Mr. Wilson:

The City and County of San Francisco Department of City Planning, Office of Environmental Review is currently preparing a Environmental Impact Statement/Impact Report (EIS/EIR) for the Mid-Embarcadero Replacement Project.

As part of the environmental review process, the City is requesting input from resource agencies and interested parties regarding potential impacts of the project. The City is currently preparing a Section 4(f) Evaluation pursuant to the requirements of the National Environmental Policy Act. As part of this study, information regarding publicly owned parkland and historic sites within the project study area is being requested. A map depicting the project study area is attached.

The City requests that the Department of Housing and Urban Development review the attached map and provide information regarding properties within the Study Area under the jurisdiction of the Departemnt of Housing and Urban Development. This information will be taken into consideration in conducting the environmental review of the project.

If you have any questions regarding the project please contact me at (415) 558-6384.

Very truly yours,

Hillary Gitelman
Office of Environmental Review

Attachment

HG:pg

APPENDIX B

Park and Open Space User Surveys
Conducted April/June 1994

USER SURVEY
JUSTIN HERMAN PLAZA - AREA A

User Type	Tuesday, April 19			Wednesday, April 20			Friday, April 22			Average		
	9:20 a.m.	12:45 a.m.	3:40 p.m.	9:30 a.m.	12:45 p.m.	4:00 p.m.	9:45 a.m.	12:45 a.m.	4:00 p.m.	a.m.	noon	p.m.
Joggers		2								0	.7	0
Bikers		2	3		5	1	2	4	2	.7	4	2
Lunchers		400	5		450			320	4	0	390	3
Walkers	5	15		5	40	10	10	50	7	7	35	6
Sitting	10	15	29	8		30	10	15	25	9	28	28
Homeless	1	5		2	2	2	1	2	2	4	5	1
Vendors		1					1	10	2	4	4	2
Other - Rally members					125					N/A	N/A	N/A
Skaters			25			30			30	0	0	28
Total Users	16	440	62	15	627	73	27	431	77	18.7	466.7	70.0

Counts are intended to represent an instantaneous "snap shot" of users within each area. Survey counts were conducted for approximately one to three minutes. Efforts were made not to count users who entered the area after the count had begun.

USER SURVEY
JUSTIN HERMAN PLAZA - AREA B

	Tuesday, April 19			Wednesday, April 20			Friday, April 22			Average		
User Type	9:20 a.m.	12:45 p.m.	3:40 p.m.	9:30 a.m.	12:45 p.m.	4:00 p.m.	9:45 a.m.	12:45 p.m.	4:00 p.m.	a.m.	noon	p.m.
Joggers		1				1			2	0	.3	1
Bikers					1				1	0	.3	.3
Lunchers		20			30			8		0	19	0
Walkers					15	3		2	5	0	6	3
Sitting	4	20	1	2	27	6	2	6	4	3	18	4
Homeless		2	4	2	4	2	2	5	1	1	4	2
Total Users	4	43	5	4	77	12	4	21	13	4.0	47.6	10.3

Counts are intended to represent an instantaneous "snap shot" of users within each area. Survey counts were conducted for approximately one to three minutes. Efforts were made not to count users who entered the area after the count had begun.

USER SURVEY
EMBARCADERO PROMENADE

User Type	Thursday, June 2			Friday, June 3			Monday, June 6			Average		
	9:30 a.m.	12:45 a.m.	3:30 p.m.	9:30 a.m.	12:45 p.m.	3:30 p.m.	9:30 a.m.	12:45 p.m.	3:30 p.m.	a.m.	noon	p.m.
Joggers	4	3	6	3	6	4	0	7	0	2.5	5.3	3.5
Bikers	3	1	0	1	3	2	1	2	0	1.5	2.0	0.5
Lunchers	0	60	0	0	70	4	0	55	0	0	61.5	0.5
Walkers	5	25	9	3	20	7	2	31	7	3.5	25.5	7.5
Sitting	4	15	8	2	10	6	7	12	2	2.5	12.5	8.5
Homeless	1	2	1	0	1	2	5	1	3	2.0	1.5	2.0
Total Users	17	106	24	9	110	22	10	108	12	12.0	108.3	22.5

Counts are intended to represent an instantaneous "snap shot" of users within each area. Survey counts were conducted for approximately one to three minutes. Efforts were made not to count users who entered the area after the count had begun.

USER SURVEY
BLOCK 202

User Type	Tuesday, April 19			Wednesday, April 20			Friday, April 22			Average		
	9:20 a.m.	12:45 p.m.	3:40 p.m.	9:30 a.m.	12:45 p.m.	4:00 p.m.	9:45 a.m.	12:45 p.m.	4:00 p.m.	a.m.	noon	p.m.
Joggers		6							2	0	2	.7
Bikers				1		1		1		.3	.3	.3
Lunchers		3			5			2		0	3	0
Walkers	3	13	7		6	7	5	14	12	3	11	9
Sitting	1	19	3	1	15	5	9	6	3	4	.3	4
Homeless	6	1	5	2	2	2	3		2	4	11	3
Total Users	10	42	15	4	28	15	17	23	19	11.3	30.3	17.0

Counts are intended to represent an instantaneous "snap shot" of users within each area. Survey counts were conducted for approximately one to three minutes. Efforts were made not to count users who entered the area after the count had begun.

USER SURVEY
BLOCK 203

User Type	Tuesday, April 19			Wednesday, April 20			Friday, April 22			Average		
	9:20 a.m.	12:45 p.m.	3:40 p.m.	9:30 a.m.	12:45 p.m.	4:00 p.m.	9:45 a.m.	12:45 p.m.	4:00 p.m.	a.m.	noon	p.m.
Joggers		2			2				1	0	1	.3
Bikers										0	0	0
Lunchers										0	0	0
Walkers	5	7	12	1	8	20	11	10	15	6	8	16
Sitting		2	1	1					1	.3	.6	.6
Homeless	2	2	2	1			2		1	2	.6	1
Total Users	7	13	15	3	10	20	13	10	18	8.3	10.2	17.9

Counts are intended to represent an instantaneous "snap shot" of users within each area. Survey counts were conducted for approximately one to three minutes. Efforts were made not to count users who entered the area after the count had begun.

APPENDIX C

Letters from the Port and the San Francisco Recreation and Park Department expressing concurrence with the findings and conclusions of the 4(f) report.

PORT OF SAN FRANCISCO

Ferry Building
San Francisco, CA 94111
Telephone 415 274 0400
Telex 275940 PSF UR
Fax 415 274 0528
Cable SFPORTCOMM
Writer

November 15, 1994

Ms. Hillary Gittleman
Office of Environmental Review
Department of City Planning
1680 Mission, 4th Floor
San Francisco, CA 94102

RE; Review of 4(F) Report for the Mid-Embarcadero.

Dear Hillary,

This letter will confirm that the Port of San Francisco has been given an opportunity to review the Draft 4 (F) Report for the Embarcadero Roadway project. We believe the report accurately identifies all 4 (F) resources in the Port of San Francisco jurisdiction and in the mid-Embarcadero roadway area.

While the Port has a number of concerns about the potential impacts of the proposed project on its property (which contain 4(f) resources) in the study area, we believe those concerns are being examined in detail in both the Socioeconomic and Transportation reports being prepared for the City by Parson Brickerhoff.

If I may provide more information about the Port's participation in the roadway project and its environmental review, please give me a call (274-0352).

Sincerely,

Joe R. Wyman, AICP
Planner

City and County of San Francisco **Recreation and Park Department**

City & County of [illegible]

ENVIRONMENTAL [illegible]

November 10, 1994

Hillary Gitelman
Office of Environmental Review
Department of City Planning
1660 Mission Street
San Francisco, CA 94103

Dear Ms. Gitelman:

Thank you for the opportunity to comment on the draft Section 4(F) Evaluation, Alternatives to Replacement of the Embarcadero Freeway and the terminal Separator Structure.

As you know, the San Francisco Recreation and Park Commission has jurisdiction over public open spaces in the vicinity of the Embarcadero, including Maritime Plaza, Justin Herman Plaza, Embarcadero Park (north of Justin Herman Plaza, in Block 202). In addition, the Recreation and Park Department has maintained the existing open spaces on Assessor's Blocks 202 and 203 which are currently owned by Caltrans.

The Recreation and Park Department has been involved in the planning process for improvements currently being analyzed as alternatives to the Embarcadero Freeway The Department has been consulted in the course of the Section 4(F) Evaluation.

With respect to the findings stated in the report, the Recreation and Park Department staff agrees that adequate mitigation measures should be taken to minimize harm and to reduce the potential impacts to public parks and open spaces in the vicinity of the project. The 4(F) report lists several measures to minimize harm to parks and open spaces during construction on page 4-12.

In addition to those measures, Rebecca Kohlstrand of the CAO's Office has informed the Recreation and Park Department that the cost estimates for both the roadway and open space projects assume that the roadway project will cover minimum improvement costs for open space from the Ferry Building west to the Port jurisdiction line. This includes the newly created open space area between the roadway and Justin Herman Plaza. A copy of Ms. Kohlstrand's letter is attached for your information.

Given this assurance from the CAO's Office, Recreation and Park Department staff concur with your findings, which state that Alternatives One, Two, Three, and Four would not adversely affect 4(F) resources under the Department's jurisdiction. Alternative 5 (options a and b), however, would encroach onto park property (Justin Herman Plaza), adversely affecting that 4(F) resource.

McLaren Lodge, Golden Gate Park
Fell and Stanyan Streets
FAX: (415) 668-3330
Information: (415) 666-7200
TDD: (415) 666-7043
San Francisco 94117

With respect to Alternative 5 (options a and b), you should be aware that unless certain conditions are met, the sale, discontinuance or abandonment of park property would require an amendment to the City Charter; amendment of the City Charter would require a vote of the people. Similarly, the State of California, Public Resources Code also prohibits the discontinuance of park uses on open space acquired by public agencies.

If you have any questions or require further information, please contact Joanne Wilson at 666-7110.

Sincerely,

Mary E. Burns

Mary E. Burns
General Manager

MEB/JCW

Attachment

c: Deborah Learner
Joanne Wilson

JCW:1089d

Office of
CHIEF ADMINISTRATIVE OFFICER
Room 289 City Hall, San Francisco, CA 94102
Telephone: 415-554-5780 Fax: 415-554-7122

Rudolf Nothenberg
Chief Administrative Officer

WATERFRONT at WORK
Waterfront Transportation Projects

November 7, 1994

Mary Burns, General Manager
Recreation and Parks Department
McLaren Lodge
Golden Gate Park
San Francisco, CA 94117

Dear Mary,

The city is nearing completion of the Section 4(f) Evaluation for the Mid-Embarcadero Roadway/Terminal Separator Structure Replacement Project EIR/EIS. Prior to publication of the 4(f) report, Caltrans has requested a letter from your department that provides the following information:

a) Description of the 4(f) resources under the Recreation and Park Department's jurisdiction (Justin Herman Plaza and a portion of Block 202);
b) acknowledgement that your staff has participated during the planning and environmental process for the project; and
c) concurrence with the findings of the Draft Section 4(f) Evaluation.

Prior to providing this letter, Joanne Wilson has requested assurance that funds will be available through the roadway project to provide a "finished edge" between The Embarcadero right-of-way and Justin Herman Plaza to the west. The intent being to avoid a ragged edge adjacent to the roadway where new open space will be created.

The cost estimates for both the roadway and open space projects assume that the roadway project will cover minimum improvement costs for open space from the Ferry Building west to the Port jurisdiction line. This includes the newly created open space area between the roadway and Justin Herman Plaza. As we advance to the design phase for the projects, we will continue to coordinate with your staff on how these improvements can best be accomplished, given the current lack of a dedicated funding source for the overall Mid-Embarcadero open space program.

As we are anxious to finalize the Section 4(f) Technical Report, I will be happy to address any outstanding concerns you or your staff may have this week. You may reach me at 554-5786. I look forward to receipt of your letter as requested by Caltrans.

Thank you for your assistance.

Sincerely,

Rebecca L. Kohlstrand

Rebecca L. Kohlstrand
Chief Planner

midem\4(f)

cc: Joanne Wilson, Rec & Parks
Jenny O'Connor, DPW
Hillary Gitelman, DCP

PLACE
POSTAGE
HERE

San Francisco Planning Department
Office of Environmental Review
1660 Mission Street
San Francisco, CA 94103

Attn: Hillary Gitelman, EIS/EIR Coordinator
Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure (92.202E and 94.0603)

PLEASE CUT ALONG DOTTED LINE.

RETURN REQUEST REQUIRED FOR FINAL ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT

REQUEST FOR FINAL ENVIRONMENTAL IMPACT REPORT

TO: San Francisco Planning Department
Office of Environmental Review

Please send me a copy of the Proposed Final EIS/EIR.

Signed: ______________________________

Print Your Name and Address Below

Please cut along dotted line; apply postage and mail.

Return request required for Final EIS/EIR.